

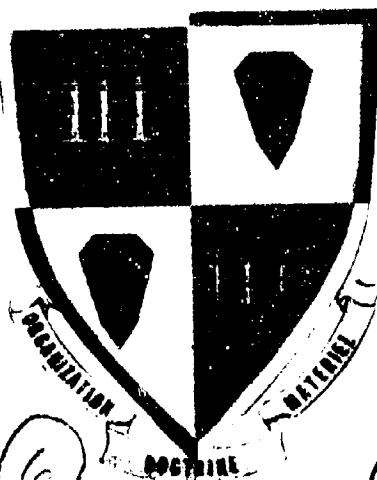
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UNITED STATES ARMY

INFANTRY
COMBAT DEVELOPMENTS
AGENCY

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~~GEORGIA, 8 DEC 1962~~

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EVALUATION
STUDY

DOWNGRADED AT 3 YEAR INTERVALS
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PER: Dean W. Wright
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CAGP (8 Dec 62) 1st Ind (C)
SUBJECT: Rifle Evaluation Study (U)

HQ, U. S. Army Combined Arms Group, Fort Leavenworth, Kansas, 10 December 1962

TO: Commanding General, U. S. Army Combat Developments Command, Fort Belvoir, Virginia

1. (U) The Commanding General, U. S. Army Combined Arms Group, was briefed on 10 December 1962 on the Rifle Evaluation Study. He concurs with the conclusions and recommendations, but recommends that the arguments supporting them be strengthened.

2. (C) General areas that require elaboration and reinforcement:

a. The organization of a ROAD Infantry Squad should be shown in the study. Any discussion of equipment and operations can be better understood if the framework within which they are to be employed is clearly presented. This is particularly true if the audience is not familiar with the details of the new organization. Organizations at inclosure 2 should be included.

b. The discussion of squad operational concepts (Annex B) should be strengthened to dispell impressions that the size of the squad is inversely proportional to the rate of fire of its weaponry. The size of the squad is theoretically limited only by the span of control of the squad leader. Practically, it may be governed by strength ceilings, squad carrier capacities, or expected high attrition rates.

c. The implication of the study directive that greater automatic fire power might reduce the size of the squad should perhaps be interpreted that greater automatic fire power might reduce the density of riflemen on the FEBA. The study should point out clearly that rifleman density is also a function of observation and fields of fire, as limited by darkness, poor weather, smoke, rough terrain, and vegetation.

d. The discussion in Appendix VI to Annex C on the impact of using a 5-7 man squad organization should include statistical data on casualties experienced in Infantry squads and the requirement for squads to accept attrition and yet be capable of defending frontages of up to 120 meters. (See para 3 below for specific comments.)

e. A principal characteristic required for rifles used by Infantry squads is reliability. The weapon used must be capable of operating under all of the environmental conditions in which the Infantry will be required to fight. When automatic weapons, such as machine guns or automatic rifles, are lost because of battle casualties or equipment malfunction, the rifle then becomes the primary weapon a unit must employ to defend itself. The exceptionally high number of malfunctions experienced by the AR-15, as shown by this study and other test data, indicates that the AR-15 rifle would not be an acceptably reliable weapon to be placed in combat units.

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CAGP (8 Dec 62)

1st Ind (C)

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3. (C) Specific recommended additions are as follows:

a. Page 2, para 3a: Add: "Squad organizational charts are attached as an inclosure 2."

b. Page 5, para 3d(2)(c), line a: change "adverse" to "close terrain."

c. Page 6, para 4c: Amend to read: The doctrine, employment and equipment capabilities of Communist Bloc countries dictate that the individual soldier be armed with a weapon matching or exceeding the capabilities of the individual weapon of potential enemy riflemen. (Annex D)

d. Page B-5, para 3b(4) line 15: Add -- BG S. L. A. Marshall has concluded that for psychological reasons it is necessary that positions be organized using two-man foxholes. The "buddy" system is necessary to the good mental attitude of the frontline soldier. The feeling of loneliness in the face of the enemy when the soldier occupies a foxhole by himself normally result in partial or complete loss of the soldier's efficiency.

e. Page B-5, para 3b(4): (U) Begin para - "Squad organization isn't the sole consideration in preparing defensive positions. Density of weapons along the FEBA is an important determining factor. Through the years, even with the development of improved weapons, little change in the organization of squad defensive positions has evolved. It has been necessary to keep the fox-hole interval distance at approximately 20 meters. Little or no change in this interval is anticipated for the future."

f. Page B-6, para 3b(4)(a), line 22, after word "required," add: "Machine guns provide fires with great lethality at night or under conditions of poor visibility. These prearranged fires can only be fired by a machine gun on a stable mount and not by hand held automatic weapons."

g. Page B-9, Para b, line 5, after word "include" add the word "combat."

h. Page B-10, para (b) line 14, delete remainder of paragraph beginning with the word "also."

i. Page B-10, para 3b(1)(c): Add--"Attrition is a serious consideration in Infantry units. Studies based on WWII experiences in Italy concluded that with authorized strength of 68.5% of Infantry Division total, the Infantry suffered 94.7% of the division casualties. FM 101-10 illustrates that battle casualties by branch as percent of total battle casualties, the Infantry suffered 31.9%. Similar figures for the first 16 months of the Korean conflict state the figure as being 82.3%. FM 101-10 further states that of all battle and non-battle casualties inflicted in a nonnuclear war, 93% will be suffered by the Infantry and further, that 87.4% of these will be riflemen or heavy weapons crewmen."

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j. Page B-13, para 4c: Add -- The M-72 LAW currently fulfills this requirement.

k. Page IV-C-1, para 2: Add: "Until such time as a more mobile, less vulnerable APC is developed, Infantry being transported in the carrier is highly vulnerable and may be killed en masse" - a squad being lost with each destroyed APC. The lack of an APC with capabilities desired by the Infantry lessens the current requirement for a fighting from within capability for the M113.

FOR THE COMMANDER:

Robert C. Works
ROBERT C. WORKS
Colonel, Infantry
Deputy Commander

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ROAD RIFLE SQUAD
TOE 7-18E

| | |
|--------------------|-------------------------------|
| Squad Leader | M-14, bayonet |
| Fire Team Leader | M-14, bayonet |
| Auto Rifleman | M-14 w/bipod, bayonet |
| Grenadier | 40mm Grenade Launcher, pistol |
| Rifleman | M-14, bayonet |
| Rifleman | M-14, bayonet |
| Fire Team Leader | M-14, bayonet |
| Automatic Rifleman | M-14 w/bipod, bayonet |
| Grenadier | 40mm Grenade Launcher, pistol |
| Rifleman | M-14, bayonet |

INFANTRY SQUAD PROPOSED BY FT BENNING AD HOC COMMITTEE

Each Rifle Platoon contains 3 rifle squads.

| | |
|------------------------|------------------------|
| Squad Leader | M-14, bayonet |
| Asst. Squad Leader | M-14, bayonet |
| Machinegunner | M60 machinegun, pistol |
| Asst. Machinegunner | M-14, bayonet |
| Rifleman (ammo bearer) | M-14, bayonet |
| 2 Grenadiers | M79, pistol |
| 1 Automatic Rifleman | M-14, w/bipod, bayonet |
| 3 Riflemen | M-14, bayonet |

Incl 2

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US ARMY INFANTRY COMBAT DEVELOPMENTS AGENCY
Office of the Commanding Officer
Fort Benning, Georgia

CAGIN

8 December 1962

SUBJECT: Rifle Evaluation Study (U)

THRU: Commanding General
United States Army Combined Arms Group
Fort Leavenworth, Kansas

TO: Commanding General
United States Army Combat Developments Command
Fort Belvoir, Virginia

1. (U) The attached study is forwarded in response to Department of the Army DCSOPS CD DC Message 921911(S).

2. (U) This study has been coordinated with the Commandant, United States Army Infantry School and the President, United States Army Infantry Board and they concur with the doctrine, concepts and requirements expressed.

1 Incl
as

K. E. Ecklund
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Colonel, Infantry
Commanding

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862-47580

RIFLE EVALUATION STUDY
UNITED STATES ARMY INFANTRY COMBAT DEVELOPMENTS AGENCY
Fort Benning, Georgia

8 December 1962

RIFLE EVALUATION STUDY

United States Army Infantry Combat Developments Agency

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SUMMARY

RIFLE EVALUATION STUDY

1. (U) Reference: Department of the Army Message 921911 (S)
(ANNEX A).

2. (S) General:

a. Recent correspondence and memoranda initiated within, and between, the Department of Defense and Executive Agency of the United States Government has indicated that the M14 rifle is inferior to the Armalite AR-15 rifle and the Soviet/satellite AK-47 rifle. Views of the Department of the Army have been requested on the relative merits and effectiveness of the subject weapons.

b. By reference, above, Department of the Army directed that an evaluation study be conducted on doctrine and concepts of employment of small arms weapons to determine requirements for and desired military characteristics of these weapons. Concurrent with this study effort, a world-wide comparative evaluation was conducted by the US Army, through field test, to determine the relative firepower effectiveness of the AR-15 and M14 rifles.

c. In conduct of the doctrine, employment and requirements portion of the rifle evaluation study, tactical aspects and utility of the candidate weapons were to be considered. Using merits and attributes of each weapon considered, a set of hypotheses and courses of action to be pursued were established to determine the most suitable weapon and appropriate action to be undertaken. Factors and hypotheses to be considered were:

- (1) Range requirements for rifles and machineguns.
- (2) Role of the machinegun.
- (3) Requirements for the machinegun in light of an automatic rifle firing capability.
- (4) Requirements for rifle grenade launchers.
- (5) Requirement for firing from armored personnel carriers

(APC).

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(6) Requirement for the bayonet and for each rifle to accept the bayonet.

(7) Impact on doctrine and employment when employing a five to seven man rifle squad.

(8) Comparative attributes of the AR-15, M14 and AK-47 rifles and the preferable rifle if an equipment modernization program decision was to be made.

(9) Advisability of introducing AR-15 or AK-47 type under currently existing conditions.

(10) Appropriate course of action to be pursued from rifle development and procurement aspects.

3. (S) Discussion:

a. The methodology used in approaching this study is an analysis and requirements of the basic combat unit of the US Army; the Infantry squad. Although the individual soldier is the major user of small arms weapons, he does not function in battle as an individual. Rather, he functions as a member of a team - the squad - and cannot be considered in isolation. Doctrine and concepts of employment envision teamwork between combat elements. Since the Infantry squad is the basic combat unit, it is considered the most valid organization for evaluation of doctrine, employment and requirements for small arms weapon. Annex B contains a discussion of concepts and requirements and is the study foundation.

b. Using the doctrine, operational and organizational concepts and materiel requirements developed in Annex B, characteristics and needs for small arms weapons to support them are discussed in Annex C. Based on United States Army Infantry Combat Developments Agency, United States Army Infantry Board and United States Army Infantry School research and analysis, previous study efforts and military judgement, the following factors emerge as necessary to successful offensive-defensive operations.

(1) Rifles must possess at least a 400 meter effective range capability. Basically, this need is dictated by range capabilities of small arms weapons in use by potential enemies and is commensurate with the rifleman's ability to detect and engage targets. (Appendix I to Annex C).

[REDACTED]

[REDACTED]

(2) Periodically in combat, a requirement will exist for all riflemen to employ automatic firepower. Primarily, this will occur in defensive operations when a large volume of fire is needed to delay, halt or repel enemy attack. In offensive situations, particularly the assault phase, automatic fire may contribute to the success of the attack. Every rifleman must have a capability of delivering selective automatic rifle fire against area targets to ranges of at least 400 meters, plus at greater ranges, lethal fires with an acceptance of reduced accuracy and effectiveness. (Appendix II to Annex C)

(3) The role and range of the machinegun and requirements for automatic rifle fire are closely interrelated. Both complement each other and neither can be a satisfactory replacement for the other. Machineguns are employed in offensive supporting fire roles. In defensive situations they provide the mutually supporting, interlocking bands of fire which, when integrated with indirect fire weapons form the basic defensive fire plan. Both situations require a capability to engage enemy forces at ranges out to 1100 meters and equally as important is the requirement to equal or exceed the range capabilities of similar weapons used by the enemy. (Appendix II to Annex C)

(4) Each rifle should possess a grenade launching capability to fill a requirement for responsive high explosive fragmentation fires between maximum hand grenade range to minimum mortar and artillery fire ranges. These fires must be accurate and immediately responsive to permit engagement of small, fleeting targets. Since technology could not produce this capability in a rifle at the time the M14 was developed, another development program was required. The result of this program is the M79 grenade launcher which is effective to ranges of 350-400 meters. Until development and introduction of the Special Purpose Individual Weapon (SPIW) is completed, the M79 must be retained to fill the grenade requirement. (Appendix III to Annex C)

(5) Infantry doctrine and employment of armored personnel carriers (APC) does not visualize a requirement for habitual small arms firing from the carrier. The requirement is for use in emergencies only, and when employed, is suppressive fire delivered by two individuals. Configuration of the current M113 APC permits this capability and no increased requirement for firing from the vehicle is contemplated. (Appendix IV to Annex C)

(6) Tactically, the bayonet is seldom used in combat. However, its psychological influence both on the attacker and defender is an influencing factor favoring retention of the bayonet. Also, the bayonet may be used advantageously in riot control and civil disturbances. The bayonet should be retained since the AR-15, the M14 and the SPIW, the most competitive weapons, have provisions for attaching the bayonet. Design and development of a lighter weight, general purpose knife which also serves as a bayonet should be pursued. (Appendix V to Annex C)

[REDACTED]

(7) A major requirement for the squad is staying power - the ability to remain in combat for prolonged periods of time, suffer attrition, and yet, retain a relative degree of combat effectiveness. A five to seven man squad organization cannot accept attrition and retain the required degree of combat effectiveness. Regardless of the theoretical firepower potential and effectiveness it may possess when at full strength, attrition of personnel in battle will affect its staying power more readily and adversely than squads of a larger size. (Appendix VI to Annex C)

c. Using the above factors and other Infantry tactical requirements, each weapon has been evaluated as to its tactical utility and capability to meet military requirements. This comparative evaluation is discussed in detail in Annex E.

d. In response to the hypotheses and courses of action posed in the study directive, the relative merits, attributes and capabilities of each candidate weapon to support tactical concepts and ultimate developmental objectives have been evaluated. (Annex B-3) The results of this analysis as applied to varying hypothetical situations and courses of action are as follows:

(1) Determine the preferable rifle for world-wide usage under a hypothetical situation which considers initial introduction of a weapon into an army, i.e., as if the basic decision were to be made now without reference to the decision already made.

(a) For purposes of analysis, it shall be assumed that Infantry units are equipped with the M-1 and M-2 carbine and that each candidate weapon - the AR-15, M-14(modified), M-14(USAIB), AK-47 and SPIW - enjoys the same degree of development or feasibility as now prevails. The ultimate materiel objective is a lightweight multipurpose weapon which, when fired from the shoulder, has the selective capability of either point or area fire and a high kill probability. Since this is the objective, the preferable rifle is unequivocally the SPIW in an accelerated development and production program. Although economics and political aspects must be considered at national level, they are not major considerations of this study. However, to divert funding, development and test effort, and production base to any other weapon as an interim system would be economically and politically unsound. The objective must be paramount - providing the Infantryman with the best weapon which technology and industry can produce within a reasonable time span.

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(b) Under this same hypothetical situation, there exists a requirement for immediate issue of an operational weapon, or an interim weapon pending availability of the SPIW. This would necessitate selection of one of the other candidate weapons. In this situation, the course of action to be pursued would be production of the M14 (USAIB). The AR-15 has many fine attributes. It is relatively small, lightweight, accurate, and favors employment in adverse terrain. The AK-47 is a new weapon with respect to US standards and is considered an inferior weapon to either the M14 or AR-15. On a world-wide base the M14 (USAIB) would achieve more tactical utility and is considered superior in meeting military requirements for range, penetrative power and firepower effectiveness against combat targets.

(2) Determine the advisability of introducing the AR-15 or AK-47 into the US Army under currently existing conditions as a total requirement for, or as an augmentation to, the M14.

(a) The introduction of the AR-15 or AK-47 as a total replacement for M14 rifles currently in hands of troops is considered undesirable. A decision to implement such a course of action would require, in the case of the AR-15 and AK-47, diversion of funding, development and test, and production effort to the detriment of the SPIW program. Currently, the SPIW program is progressing satisfactorily. Acceleration of the program may be feasible by additional funding for research, development and test effort. Industry has been briefed and invited to assist in the overall program. Any decision to change from current objectives could result in a derogatory effect on the overall small arms weapon program.

(b) Introduction of either the AR-15 or AK-47 on an augmentation basis is undesirable for it would further compound existing ammunition resupply problems by necessitating the introduction of an additional type of ammunition at the Infantry squad level. No advantages accrue from this augmentation since the AR-15 or AK-47 do not meet requirements for an Infantry squad weapon.

(c) The AR-15 has many fine attributes for adaptability and use in adverse environmental conditions. The desirability of introducing the weapon in a limited quantity to meet possible requirements of Special Forces personnel would have to be considered at Department of the Army level.

4. (S) Conclusions:

a. Operational and organizational concepts of the Infantry squad dictate the requirements and characteristics for small arms weapons. (Annex B)

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b. The characteristics and requirements discussed are necessary to ensure the US Army Infantryman has the capability to defeat any potential enemy. (Annex B and C)

c. Doctrine, employment and equipment capabilities of Communist Bloc countries influence military requirements and characteristics of US weapons. (Annex D)

d. When considering requirements, areas of employment and concepts, the SPIW is the most desirable weapon to be placed in hands of combat units.

e. As an interim small arms system, the M14 (USAIB) is the most satisfactory of all weapons evaluated with respect to environment and tactical utility pending development and production of the SPIW.

f. The AR-15 may be a desirable weapon for use by Special Forces personnel engaged in covert and overt warfare under all environmental conditions.

5. (S) Recommendations:

a. Increased emphasis be placed on the SPIW program and the program funded and developed at an optimum rate to achieve early availability.

b. Funding and production of the M14 (USAIB) stock and compensators be initiated and the items issued for field modification of weapons now in hands of combat units.

c. Consideration be given to possible use of the AR-15 by Special Forces units.

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DA, SUBJ: RIFLE EVALUATION DTD 26 OCT 62; B. LTR ODCSOPS SAME SUBJ
DTD 9 NOV 62.

1. (S) IN ADDITION TO REQUIREMENTS IMPOSED IN CITED REFERENCES
IT IS REQUESTED THAT USARCOO:

A. EVALUATE THE DOCTRINE AND CONCEPTS OF EMPLOYMENT OF
SMALL ARMS TO DETERMINE THE DESIRED MILITARY CHARACTERISTICS OF A
RIFLE. THE FOLLOWING FACTORS SHOULD BE CONSIDERED:

(1) THE RANGE REQUIREMENT FOR RIFLES.

(2) REQUIREMENT FOR AUTOMATIC FIREPOWER FOR ALL RIFLEMEN.

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- (3) THE ROLE OF THE MACHINEGUN.
- (4) THE RANGE REQUIREMENT FOR THE MACHINEGUN.
- (5) THE NECESSITY FOR THE MACHINEGUN IF EVERY RIFLEMAN HAS AN AUTOMATIC FIRE CAPABILITY.
- (6) THE NECESSITY FOR THE MACHINEGUN IF ONLY TWO RIFLE-
MEN PER SQUAD HAVE AN AUTOMATIC FIRE CAPABILITY.
- (7) THE NEED FOR A GRENADE LAUNCHER ON EACH RIFLE.
- (8) THE NEED FOR FIRING FROM ARMORED PERSONNEL CARRIAGE.
- (9) THE NEED FOR THE RIFLE TO ACCEPT THE BAYONET AND THE
EFFECT OF THE EXTRA WEIGHT ON COMBAT OPERATIONS.
- (10) THE IMPACT OF USING A FIVE TO SEVEN MAN SQUAD.

B. ASSESS, IN CONJUNCTION WITH PAR 1.A ABOVE; THE M-14, AR-15, AK-47, AND SPECIAL PURPOSE INDIVIDUAL WEAPON (SPIW) AND DETERMINE WHICH OF THESE WEAPONS IS PREFERABLE FROM THE STANDPOINT OF MEETING MILITARY REQUIREMENTS.

2. (S) THE SUMMARY SHOULD INCLUDE BUT NOT BE RESTRICTED TO THE FOLLOWING:

- A. THE PREFERABLE RIFLE FOR WORLD-WIDE USAGE UNDER A HYPOTHETICAL (3) (4) (5) (6) (7) (8) (9) (10) - A M-14 AR-15 AK-47 2

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TICAL SITUATION WHICH CONSIDERS THE INITIAL INTRODUCTION OF A WEAPON INTO AN ARMY, I.E., AS IF THE BASIC DECISION WERE TO BE MADE NOW WITHOUT REFERENCE TO THE IMPACT RESULTING FROM THE DECISION ALREADY MADE.

B. THE COMPETING ATTRIBUTES OF EACH RIFLE AND THE COMPARATIVE MERITS OF EACH UNDER THE SAME HYPOTHETICAL CONDITIONS CONSIDERED IN 2.A ABOVE.

C. THE ADVISABILITY OF INTRODUCING THE AR-15 OR TYPE AK-47 INTO THE US ARMY UNDER CURRENTLY EXISTING CONDITIONS AS A TOTAL REQUIREMENT FOR THE M-14 OR AS AN AUGMENTATION OF THE M-14.

D. IF EITHER THE AR-15 OR THE AK-47 IS CONSIDERED SUPERIOR TO THE M-14, MAKE APPROPRIATE RECOMMENDATIONS ON POSSIBLE COURSES OF ACTION TO INCLUDE:

(1) DO NOTHING.

(2) ADOPT AR-15 AS THE REPLACEMENT FOR THE M-14.

(3) ADOPT AR-15 FOR SPECIAL USES AS AN AUGMENTATION TO THE M-14. CONSIDER RATIOS OF M-14, AR-15, AND M-1 RESPECTIVELY AS FOLLOWS:
7:2:7; 7:9:0; 7:15:0.

(4) CONSIDER DEVELOPMENT OF A TYPE AK-47 WEAPON.

(5) APPLY INCREASED EMPHASIS TO FOLLOW-ON WEAPON (SPECIAL PURPOSE INDIVIDUAL WEAPON).

ON 2.A AR-15 AK-47 M-14 M-14 AR-15 AK-47 M-14 (1) (2) AR-15 M-14

(3) AR-15 M-14 M-14 AR-15 M-1 7:2:7 7:9:0 7:15:0 (4) AK-47 (5)

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3. (S) RIFLE M-14 AS USED HEREIN IS MEANT TO INCLUDE THE RECENTLY MODIFIED VERSION OTHERWISE KNOWN AS THE USAIS RIFLE.

4. (U) IT IS FURTHER REQUESTED THAT THE ABOVE BE PREPARED IN ACCORDANCE WITH THE ADMINISTRATIVE INSTRUCTIONS CONTAINED IN REF .D AND BE FORWARDED SO AS TO REACH THIS HEADQUARTERS BY 13 DEC 1962.

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ANNEX B - The Squad - Its Mission, Doctrine, Tactics, Techniques and Requirements - to Study (Rifle Evaluation) 3 December 1962

1. (U) General. The basic mission of the Infantry is to close with the enemy by means of fire and maneuver in order to destroy him or capture him or repel his assault by fire, close combat and counterattack. To accomplish this mission, a continuing requirement exists for the Infantry to seize and hold key terrain. The weapons which are provided each echelon down to and including the individual rifleman must ensure that the capability exists to accomplish this mission. In war, man and the equipment provided him are the basic ingredients of success. But man and his equipment cannot be considered in isolation. The Infantryman functions not as an individual during battle, but as a member of a team. Properly trained, motivated and led in combat, the man, functioning as a member of the team achieves victory over his enemy. The Infantry squad, the team in which he functions, is the smallest combat element in the Army. It is the basic fighting element containing an optimum number of personnel with the proper type and mix of weapons which must function as a team and retain adequate combat effectiveness despite normal battle losses. The basic foundation then, of this study, is the squad. To properly determine weapon requirements and characteristics, the operational and organizational concepts of the squad must be examined. From this examination materiel requirements can be stated for those weapons required to support the concepts.
2. (U) Mission. The mission of the Infantry squad is to close with the enemy by means of fire and movement or maneuver (when conducting operations as part of a platoon or larger unit) in order to destroy him or capture him or repel his assault by fire and close combat.
3. (C) Operational Concept.
 - a. The Infantry squad is the basic fighting element organized and equipped to conduct close combat. It is the basic tactical element of the Infantry platoon. The squad must be capable of conducting sustained offensive and defensive operations as a part of a larger unit. Also, it must be capable of operating independently for short periods of time when employed in patrol or raid type operations. Normally, the squad functions as a part of the Infantry platoon in attack or defensive situations.

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The inherent mobility of the squad is the foot mobility of the individual Infantryman. Because of this primary mobility means, the weapons organic to, and employed by, the squad must be man-portable. The weapon characteristic of man-portability also permits the squad to accept readily other means of ground or air mobility to improve combat effectiveness and conserve the fighting strength of the individual. These mobility means may be either organic to the squad or may be provided from external resources. The foot mobility of the individual and the man-portability characteristic of weapons must be retained continuously to ensure that the squad, when forced to dismount from, or denied the use of, other mobility means, can successfully accomplish its mission. The basic tactics and techniques employed by the squad are equally applicable in either nuclear, non-nuclear warfare or sublimated environment. With few exceptions, they also remain essentially unchanged regardless of the mobility means.

- b. Offensive Operations. In the offense, the squad attacks as a part of the Infantry platoon. The squad leader adapts combat formations to conform to the platoon attack plan and existing conditions. The squad may be employed either as a base of fire or as a maneuver element of the platoon. Normally, because of its relatively small size and controllability over extended distances, the squad, by itself, will not be required to conduct fire and maneuver simultaneously but will perform fire and movement.

- (1) Fire and Maneuver. These are the two prime ingredients of offensive action. The Infantry squad may perform either fire or maneuver separately, but seldom simultaneously. When employed as a fire support element, the squad delivers effective semiautomatic and automatic point and area fires. A sufficient volume of direct fire, properly distributed within the target array, forces the enemy to seek cover and prevents his delivering fire against the attacking elements. Indirect fire weapons of the squad, such as grenade launchers, also are employed against defiladed targets to add high explosive fragmentation fires and either kill or force the enemy to move. When employed as a maneuver element, the squad moves by a covered and concealed route, desirably to the flank or rear of the enemy position.

[REDACTED]

While the base of fire element delivers the destructive fire to destroy the enemy or occupy his attention, the maneuver element moves to a position which will permit an assault of the objective. As the assault commences, fires of the fire support element are lifted, or shifted, to permit the assaulting force to close with and destroy the enemy.

- (2) Fire and Movement. The squad is ideally suited for accomplishing fire and movement simultaneously. This form of attack differs from fire and maneuver in that, once engaged by the enemy and forced to deploy, the squad employs its organic weapons to deliver effective fire on the enemy out to minimum ranges of 400 meters. Simultaneously, forward movement of individuals is accomplished. The forward movement normally is by bounds; individuals advance by running, creeping or crawling while other members of the squad deliver fire. This process is alternated within the squad until a position is reached to assault the objective. Either the fire support element or the maneuver element can accomplish fire and movement.
- (3) Conduct of the Attack. The squad, as a part of the platoon, advances to the line of departure in the formation most suited to the platoon plan of attack. The line of departure is an easily identifiable terrain feature perpendicular to the direction of attack from which the attack is coordinated and launched. Subsequent to crossing the line of departure, the squad(s) designated as the maneuver element initiates fire and movement along covered and concealed routes to the flank or rear of the enemy position. The squad designated as the fire support element establishes a position from which effective, aimed fire can be delivered on the objective. Individual weapons fire at known, or suspected, enemy targets within the sector of fire of the individual rifleman. Automatic weapons, rifles and machineguns, engage all targets within the limits of the target array, adding high volume aimed fire. Mixed with these fires are the high explosive fragmentation fires of squad grenadiers and indirect fires of higher echelon supporting weapons. Once the maneuver element(s) reaches a position from which the assault can be launched,

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heavy mortar and artillery supporting fires are either lifted, or shifted, on signal and the assault commences. The point at which the assault is initiated is approximately 100-150 meters, depending on terrain and nature of the defensive position, from the objective area and desirably, should be a covered position. As the assault is launched, direct fires of the fire support squad increase in intensity to maintain fire superiority over the enemy. As the assault element advances squad weapons, grenade launchers and hand grenades are used to blanket the enemy position. During the assault phase and to fix the enemy and prevent his return of fire, automatic weapons are employed to the maximum. Subsequent to the successful attack, the objective area is occupied to repel counterattack. Squads occupy their areas of responsibility and plans are made to either secure the area or continue the attack. With the following exceptions these tactics and techniques are equally applicable to Infantry, Airborne Infantry and Mechanized Infantry squads.

- (a) Airborne Infantry Squads. The primary difference in tactical operations of the Airborne Infantry squad when compared to the Infantry squad is their mode of transport and delivery to the battle area. Normally, Airborne Infantry units will arrive by parachute in the battle area. Once on the ground and reorganization has been accomplished the method of achieving their mission is the same as for Infantry squads. Major reliance is placed on the foot mobility of the individual to reach the objective area.
- (b) Mechanized Infantry Squads. The Infantry squad, when provided with an organic armored personnel carrier, is designated as mechanized Infantry. The purpose of the armored personnel carrier is to provide transport for the squad. As such, the carrier also preserves the fighting strength of the squad by placing the individual riflemen as close to their objective area as possible. The carrier also provides a degree of protection to individuals from normal battlefield hazards such as fragmentation, small arms fire, residual radiation and anti-personnel mines. Normally, armored personnel

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carriers are employed in coordination with tanks. This dictates that terrain conditions favor the employment of armor and mechanized forces. The armored personnel carrier (APC) is not a tank. Tanks are used to lead, attack with or support by fire the movement of armored personnel carriers. During movement from the line of departure, the squad rides in the carrier. The vehicular armament is used to deliver, in coordination with heavier supporting weapons, fires against the enemy position. Vehicle commanders (squad leaders) direct the movement of their carriers into the attack formation. Movement from the line of departure to attack positions or dismount areas is made as rapidly as possible. Once in the attack or dismount area, the squad dismounts and launches the assault under cover or direct and indirect fire weapons. At times, against lightly defended areas, rapidly retreating enemy, or in ambushes and emergencies, the squad may fire and fight from the carrier. This is the exception rather than the rule and the decision to fight mounted or dismounted can only be made by the commander based on the tactical situation.

(4) Defensive Operations. The squad as a tactical element of the platoon in defensive operations will occupy a portion of the platoon defensive area. Normally, squads will be employed abreast with maximum firepower oriented in the expected direction of attack. Each squad will organize and be responsible for a sector of the platoon area. Under ideal terrain conditions (relatively open, rolling ground) the squad will organize the sector in two-man foxholes with an interval of 20 meters between foxholes. When single holes are used this interval is halved. Two-man foxholes are preferred if squad strength and fields of fire permit. The squad can defend on frontages of 30 meters in unfavorable terrain and up to 120 meters in open terrain.

(a) In organizing the squad defensive sector, the squad leader personally establishes the position of each foxhole and assigns sectors of fire to riflemen, automatic weapons and grenadiers. He ensures that the sectors of

[REDACTED]

fire of individual riflemen overlap and the desired density of fire can be delivered on approaches to the position. If terrain permits, machineguns are assigned principal directions of fire and final protective lines. Machineguns as the primary automatic weapon about which defensive positions are organized, are positioned to obtain maximum advantage of long range grazing fires. In the mechanized rifle squad the additional machinegun carried in each rifle squad APC is employed within the squad based on guidance received from the platoon leader. If the terrain and situation permit flanking and grazing fire, the machineguns are assigned final protective lines (FPL). If the terrain does not permit the firing of an FPL, a principal direction of fire is assigned. A desirable FPL should stretch across the entire front of a company and tie-in with adjacent units. To achieve this a machinegun which is stable and capable of achieving maximum grazing fire is required. These fires should be interlocking and in mutual support of other similar weapons in the platoon and company.

- (b) As the enemy advances in attack formations, he is brought under fire when observation is sufficient to permit delivery of organic and attached or supporting fires. Unless surprise fire is desired well within the effective range of riflemen, machineguns, grenadiers and riflemen open fire at maximum ranges to force the enemy to deploy, slow his advance and inflict casualties. If the decision is made to withhold fire to effect surprise at closer ranges, it must be realized that valuable time and space have been traded for the advantage of surprise. Desirably, fires will be initiated at the longer ranges to ensure that the enemy does not achieve a foothold or firepower advantage. As the enemy continues to advance, fires from squad and supporting weapons increase in intensity to deny penetration of the defensive area. If the enemy continues to advance, at the appropriate time, machineguns deliver their final protective fires to prevent access to the squad area. If these fires are unable to stop

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the advance, automatic rifle fires, hand-to-hand fighting, and grenades are used in the close combat phase to repel the enemy. Once the enemy is repelled he is pursued by fire and fires are delivered on likely areas of enemy regrouping. When the Mechanized Infantry platoon is employed in the defense, the .50 caliber machinegun or the Vehicle Rapid Fire Weapon System mounted on the APC is for close in protection and air defense of the APC. It also can be used to supplement ground fires from either vehicular or ground mounts. If employed in an off-carrier role, the gun should be positioned in the immediate vicinity of the APC. If terrain permits, it also may be employed from the carrier in a hull defilade position. Since the primary purpose of the APC is to provide mobility, it should not be exposed unnecessarily to antitank fire.

- (5) The Infantry squad also may be employed independently as a patrol or a raiding party. When employed as a patrol, the squad will accomplish its assigned mission using approved patrolling techniques described in Department of the Army training publications. Patrols are classified generally as to their mission. Various types include reconnaissance patrols, combat patrols, long range patrols or stay behind patrols. The method of introducing the patrol into the area of influence varies, but has very little influence on the techniques employed by the patrol unit. The majority of patrols may be considered as covert in nature. The primary mission of reconnaissance, long range and stay behind patrols is to secure information with respect to enemy strength and disposition. These patrols do not engage in offensive tactics. They rely on secrecy and stealth to accomplish the mission and engage in fire fights with the enemy only as a means of protection or to extricate the patrol. Conversely, combat patrols may be required to use offensive action to accomplish their mission. They may be employed to reconnoiter enemy positions by fire, to harass enemy command posts and communication centers or to secure vital information through the capture of prisoners or documents. Raids performed by squad size units are similar to combat patrols. The squad, independently or as an element

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of the platoon or company, may be employed in raid activities. A raiding force may be assigned such missions as destroying key installations, command posts, supply dumps and nuclear delivery means; capturing prisoners or materiel; or harassing the enemy to disrupt his operations. Raids are characterized by stealth and rapidity of movement to the objective area, violent, aggressive action, using organic small arms and demolition devices to create havoc and destruction, and immediate withdrawal from the area.

- (6) The Infantry squad may be employed in the conduct of counter guerrilla operations. At squad level counter guerrilla tactics fall within the principles and methods of regular combat, only techniques are modified to meet the peculiarities of counter guerrilla operations. In offensive operations the squad as part of a larger force is oriented toward destruction of guerrilla forces, and not on terrain. Normally the most effective method of accomplishing this is by encirclement. However, ambushes and raids are also extensively used. These tactics require secrecy, speed and surprise. To accomplish a counter guerrilla role, the squad requires weapons which produce a high sustained rate of fire and are man-portable. Because of the tactics normally used by the guerrilla in close terrain (see Annex D), the weapons required in the squad should be designed to produce a high volume of fire effective at short ranges, normally less than 100 meters. When conducting counter guerrilla operations under adverse terrain conditions such as jungles and heavily forested areas, weapons such as shotguns, sub-machineguns and carbines meet this requirement.

3. (C) Organizational Concepts.

- a. The Infantry squad has been subjected to numerous organizational changes in the past 30 years. The size has varied from eight to twelve to nine to eleven and, currently, ten men. (An ad hoc committee headed by the Commandant, United States Army Infantry School, and composed of senior Infantry officers at Fort Benning, Georgia, recently conducted a study of squad organizational requirements and proposed an eleven man squad consisting of a squad leader, an assistant squad leader, three riflemen, two grenadiers,

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a machinegunner, an assistant machinegunner, a rifleman (ammunition bearer) and an automatic rifleman.) Automatic weapons have been put in and taken out of the squad. All these changes are understandable since the objective has been to achieve an organization which provides a proper balance of weapons, personnel, equipment and tactics within the squad. This objective is not easily attainable when advances in weaponry and constantly changing geographical and enemy environments in which the squad must fight are considered. Since the squad is the basic combat unit, the influence which its organization exerts on platoon and company structures also must be recognized.

- b. There are certain inherent characteristics which influence the squad's combat effectiveness. In addition to these "inside" influences, there are "outside" influences which must be considered when designing the squad organization. These "outside" influences include logistical support, geographical and enemy environment, terrain and tactics.

(1) Inherent Capabilities.

- (a) Firepower Capability. This capability may be the most important characteristic. For the squad to accomplish its mission, it must be capable of delivering effective fire on the enemy or on suspected areas. Firepower capability, in short, is killing power and the reason for the squad's existence. Firepower cannot be measured solely by the theoretical volume which can be delivered. Inherent in this measurement, and which must be considered, is the actual volume delivered, the accuracy of the fire, and the distribution within the target array. Theoretical volume depends entirely on the weapon used. Actual volume, accuracy and distribution, or total effectiveness of the fire must be measured by the squad's organization and training. Putting more weapons or weapons with faster potential rates of fire into a squad does not necessarily increase the unit's firepower capability. The trajectory of the weapon and the bursting or penetrating power of the missile should also be considered. These fires complement each other and both are essential. The relative amounts needed for a squad must be related to the usual squad missions and the variations of environment.

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(b) Controllability. Effective unit control is essential to combat effectiveness. The degree of controllability attained is the best ratio of coordination achieved to control required. Communications, voice, visual or electronic, facilitate coordination and control. In the past, the squad leader has been forced to rely on voice communications, visual signals, personal contact, or a combination thereof, to direct and control the actions of his unit; currently, and in the future, electronic communications in the form of lightweight transmitter/receiver radios will ease his task of controlling squad actions. Also, the leader may be assisted by subordinate leaders who reduce his span of control to a more manageable level. Instead of being required to direct the actions of five to ten individuals, the squad leader is required to coordinate and direct no more than two subordinates. Regardless of the methods employed or structure employed to achieve control, the actions of the individuals or subunits must be effectively coordinated if full potential is to be realized.

(c) Staying Power. All of the "inside" and "outside" influences combine to give a unit staying power. Firepower, organization, controllability, environment and tactics of a unit are closely interrelated and determine combat effectiveness. Combat effectiveness then relates to staying power and staying power is measured in terms of the length of time a unit can remain effective despite battle attrition. Attrition presents a serious problem in small units such as the squad. Previous experience in combat indicates that squads have frequently functioned at 25% or more understrength. This creates a problem as how best to compensate for such losses. The answer immediately presented is to increase the size of the squad. But, while possibly being a partial answer to attrition, increased size compounds controllability. Conversely, when controllability is idealized in a small squad structure, staying power may be degraded. The small unit is then unable to accept an attrition factor and still retain sufficient combat effectiveness. Somewhere, between these upper and

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lower limits, is an optimum size; that which is manageable and because it is manageable remains effective.

- (d) Mobility. The Infantry squad must be capable of moving within the battle area regardless of geographical location. Its basic means of mobility is derived from the inherent foot mobility of the individual Infantryman. This capability will be ever present but in those areas and situations where speed of movement contributes to success, the squad must be provided with a mechanical means of mobility equal to or greater than that his adversary enjoys. The squad must be flexible in organization and equipment to accept organic or supporting mobility means when required.

(2) Outside Influences.

- (a) Combat and Logistical Support. This is the sum total of combat power and logistical back-up normally in support of forward elements. It means the timely response to forward unit needs in the form of supporting firepower, subsistence, replacements and medical evacuation. Normally, a large amount of support is provided in a tactical situation, but units also must anticipate some loss of support and, at times, total separation from supporting agencies.
- (b) Geographical Environment. The Infantry squad must be capable of fighting in any locale under varying conditions of warfare. Certain areas of the world tend to degrade combat effectiveness. Adverse terrain or climatic conditions quickly dissipate force effectiveness if proper corrective measures are not taken. However, if properly organized, trained and equipped, the squad may derive an advantage over a poorly trained and equipped enemy.
- (c) Terrain and Tactics. Terrain must be organized with ingenuity and the application of tactical doctrine. Tactics tailored to meet the terrain will increase a unit's effectiveness.

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- c. Salient characteristics and features required to optimize the fighting capability of the squad include:
- (1) Automatic rifle fire to provide the volume of fire desired.
 - (2) Accurate semiautomatic fire with a selective capability for automatic fire.
 - (3) Immediately responsive high explosive fragmentation fire.
 - (4) Controllability through chain of command from squad leader to subelement leader to individual riflemen.
 - (5) Mobility by organic armored personnel carriers in the Mechanized Infantry squad and the ability to accept supporting mobility means in the Infantry and Airborne Infantry squads.
 - (6) Staying power without compromising controllability by size or disproportionately reducing combat effectiveness by attrition.

4. (C) Materiel Requirements.

- a. After analyzing the missions required of the squad and the factors which influence organization to accomplish those missions, materiel requirements to support operational and organizational concepts can be defined.
- b. The Infantry squad, regardless of how it is transported to the battle area, is essentially a foot mobile unit in close combat. To accomplish its mission, the squad must move on foot, close with, and destroy or capture the enemy. This dictates that the weapon or weapons be man-portable. To conserve the fighting strength of the individual, they must be sufficiently light weight to permit carrying for long periods and distances. At the same time they must be durable and stable to achieve the desired accuracy; and, they must function reliably under those terrain and climatic conditions normally prevalent in the battle area.
- c. Direct fire small arms weapons must provide the Infantry with range, firepower and accuracy equal to or greater than that of those weapons used by any potential enemy.

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The squad has a requirement for both a semiautomatic and automatic rifle fire capability. Desirably, this feature should be combined in a single weapon. Advantages which accrue from this capability include a standardization of weapons within the squad, a reduction in numbers of different type weapons required in the arsenal and simplified and standardized ammunition resupply in the squad. The automatic mode must be selective. It must be employed judiciously to ensure proper expenditure of ammunition and effective fire distribution in the target array. Selectively employed, by designated members of the squad, the automatic fire of individual weapons complement the fires of machineguns. Currently, and for the foreseeable future, the individual must be capable of delivering accurate and effective semiautomatic rifle fire against point targets out to ranges of at least 400 meters; and accurate and effective automatic rifle fires against area targets to ranges of at least 400 meters, and, at even greater ranges, lethal fires with reduced accuracy and effectiveness (see Appendix II, Annex C).

- d. In addition to the direct fire small arms capability, the squad also requires some type of high explosive fragmentation projectile to employ against groups of enemy. The hand grenade carried by each individual can be used effectively out to ranges of approximately 35 meters. From 35 meters out to 400 meters there is a gap in responsive high explosive fire delivery capabilities against small fleeting groups of enemy personnel. The weapon selected for use in this role should be lightweight and reasonably accurate and be responsive to instantaneous employment by the squad. It also must be capable of delivering effective fire against personnel in defilade.
 - e. In a mechanized or armor environment the squad must be capable of defeating enemy fighting vehicles. A weapon is required which will permit close in defense against tanks and lightly armored vehicles. This weapon must be accurate at ranges out to 250 meters and must be sufficiently lightweight to permit an individual to carry the weapon in addition to his individual weapon and equipment. Desirably, it should be an expendable round of ammunition.
5. (C) Summary.
- a. The foregoing are requirements for squad individual weapons based on the tactical concepts previously discussed. From

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these requirements salient characteristics emerge and can be stated as follows:

- (1) Lightweight man-portable weapon.
 - (2) Effective range from zero to at least 400 meters with sufficient accuracy to ensure high kill probability in the semiautomatic mode.
 - (3) A selective automatic fire capability to deliver accurate and effective aimed area fire out to at least 400 meters while retaining a lethal effect at even greater ranges.
 - (4) Sufficient penetrative power at the extreme range to defeat protective clothing and equipment worn by the enemy.
 - (5) The weapon must be durable, stable and reliable.
 - (6) Possess a high explosive fragmentation capability at ranges of 0-400 meters.
 - (7) Possess a defensive capability against armored and lightly armored vehicles out to ranges of 250 meters.
- b. In the past, technology has been unable to combine all of these characteristics into a single weapon. However, research and development effort indicates that, within the near future, the majority of these characteristics can be placed in one weapon. The ultimate objective of the Infantry is to attain a weapon which is multi-purpose; one which will provide selectively a semiautomatic and automatic fire and area fire capability. Weapons currently available are satisfactory as interim equipment, but better weapons are required. Research and development effort must not be diverted from technically feasible and promising systems now in conceptual or "bread-board" status.

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ANNEX C - Military Characteristics of a Rifle - to Study (Rifle Evaluation) 8 December 1962

(S) In this annex the doctrine and concepts of employment of small arms is evaluated to determine the desired military characteristics of a rifle. Factors discussed in this annex are:

- Appendix I - Rifle Range Requirements
- Appendix II - Requirement for Automatic Firepower for All Riflemen
 - The Role of the Machinegun
 - Machinegun Range Requirements
 - Requirement for the Machinegun if Every Rifleman Has an Automatic Fire Capability
 - Requirement for the Machinegun if Only Two Riflemen per Squad Have an Automatic Fire Capability
- Appendix III - The Need for a Grenade Launcher on Each Rifle
- Appendix IV - The Need for Firing From Armored Personnel Carriers.
- Appendix V - The Need for the Rifle to Accept the Bayonet
- Appendix VI - The Impact of Using a 5-7 Man Squad

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APPENDIX I - Rifle Range Requirements - to ANNEX C to Study (Rifle Evaluation) 8 December 1962

1. (C) Current military characteristics for the Special Purpose Individual Weapon (paragraph 237a(5), Combat Development Objectives Guide) state a requirement for a point target capability at all ranges out to 400 meters. This effective range capability is considered necessary for the following reasons:

- a. This range is required to permit US Infantrymen to at least match the effective range capabilities of the individual weapons most likely to be in the hands of potential enemy Infantrymen. Two of those weapons are:

AK-47, Soviet 7.62mm Assault Rifle

Effective Range - Semiautomatic Fire - 400 meters
Automatic Fire - 300 meters

Maximum Lethal Range - 1500 meters

M58, Czechoslovakia 7.62mm Assault Rifle

Effective Range - Semiautomatic Fire - 400 meters
Automatic Fire - 300 meters

Maximum Lethal Range - 1500 meters

(Reference: Ordnance Technical Intelligence Report, May 56, prepared by Development and Proof Services, Aberdeen Proving Ground based on information from USSR manuals)

- b. The ability of an individual rifleman to hit a target is related directly to the range to target. A range of 400 meters is the approximate maximum range to which the rifleman can detect and effectively engage individual enemy personnel in the semiautomatic mode. Target detection and observation difficulties reduce the effectiveness of aimed point fires at greater ranges.
- c. Although research has established that the range of battle targets rarely exceeds 300 yards (270 meters), sufficient targets are detected at greater ranges to justify the requirement for a rifle with an effective range of more than 300 yards. Operations Research Office Technical Memorandum, ORO-T-161, 2 July 1952, subject: "The Effects of Terrain on Battlefield Visibility," states that less than 30 percent of target sightings exceed 300 yards. This percentage of sighting is considered of sufficient significance to justify a requirement for a rifle with a range capability in excess of 300 yards.

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2. (U) Consideration of how the rifle will be employed and what combat elements will be armed with the rifle further substantiate a point target range requirement of at least 400 meters. As discussed in Annex B, this weapon will be used in offensive and defensive operations and during hours of darkness as well as daylight. In the conduct of these operations the rifleman will be required to deliver point and area fires at varying ranges depending upon the situation, visibility and terrain. Generally, the objective will be to defeat enemy forces (disperse, halt or at least lessen the strength of enemy forces) as far forward of the forward edge of the battle area (FEBA) as possible. Desirably, enemy forces should be slowed or stopped at distances sufficiently far forward of the FEBA to permit the effective employment of mortar and artillery fires. Although such fires can be brought to within 25-30 meters of friendly forces under some conditions, preferably these fires should be delivered at least several hundred meters forward of friendly positions to ensure troop safety.
 3. (U) Based on these general reasons, the point target 400 meter range currently established as the required capability for the SPIW (as well as the range criteria established for the M14) is considered valid and should not be changed.
 4. (C) Although not directly related to rifle range requirements, duplex ammunition, as tested by the US Army Infantry Board (USAIB Project Number 2812 (Cont), Evaluation of NATO 7.62mm Duplex Ammunition, Headquarters United States Continental Army Command, 24 April 1961) produced a gain in combat effectiveness of 14-22 percent measured in terms of hitting and incapacitating personnel type target under simulated combat conditions by an Infantry rifle squad. This gain in ammunition effectiveness is of such significance as to favor use of the duplex ammunition by the squad. A requirement would still exist for ball ammunition with its comparatively more favorable longer range capabilities.

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APPENDIX II - Automatic Firepower and Machinegun Requirements - to ANNEX C
to Study (Rifle Evaluation) 3 December 1962

1. (U) In this appendix the following interrelated factors will be examined concurrently:
 - a. Requirement for automatic firepower for all riflemen.
 - b. The role of the machinegun.
 - c. The range requirement for the machinegun.
 - d. The necessity for the machinegun if every rifleman has an automatic fire capability.
 - e. The necessity for the machinegun if only two riflemen per squad have an automatic fire capability.
2. (S) Automatic Rifles.
 - a. Although the rifle normally will be employed as a semi-automatic weapon, there is a requirement for all riflemen to have an automatic firepower capability. At times, both in the conduct of offensive and defensive operations, the squad will be required to deliver the heaviest volume of fire possible. Such situations would include:
 - (1) Defending against "human sea" type attacks by enemy personnel. Such tactics were employed in the Korean conflict and, conceivably, could be used in the future to overwhelm defenses by numerical superiority.
 - (2) Attack and defense in close terrain situations similar to those currently encountered in Vietnam. In these situations an immediate heavy volume of countering automatic firepower on enemy personnel or positions generally is more important than semiautomatic aimed fire at fleeting targets.
 - (3) In the conduct of the assault phase of the attack, a selective automatic fire capability will permit the additional heavy fires needed to pin enemy forces in their foxholes or trenches and prevent them from delivering effective return fires.
 - b. Personnel Research Associates Report 56-3 substantiates the conclusion that a squad armed with a large automatic weapons ratio is at least equal to squads armed with varying ratios of automatic weapons in the attack mission and

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and superior to them in the defense. In order to take advantage of the benefits of automatic fires, every rifleman should have the selective capability of firing his rifle automatically even though it is recognized that in the majority of instances, most rifles will be fired semi-automatically. This selective capability must be used judiciously by the leader to preclude ammunition resupply problems.

- c. When employing his weapon in the automatic role, the rifleman must be capable of directing accurate and effective aimed fire against area targets at ranges of at least 400 meters and at even greater ranges, lethal fires with reduced accuracy and effectiveness. Fires at ranges beyond 400 meters traditionally have been effective as a means of augmenting and supporting machinegun fires. These fires may not result in substantial enemy casualties because of low hit probabilities at such long ranges; however, they serve the purpose of fixing enemy forces in place and reducing enemy capabilities of delivering effective small arms and automatic weapons fires.
- d. Based on findings by Brigadier General S. L. A. Marshall (ORO Report, "Infantry Operations and Weapons Usage in Korea, Winter 1950-51"), other advantages might accrue if all riflemen were armed with automatic weapons. General Marshall reports that in combat men tend to rally around automatic weapons fires and that the ratio of personnel firing their weapons is much greater for those armed with automatic weapons than those armed with semiautomatic weapons.
- e. Although some increase in ammunition expenditure is probable if every rifleman has an automatic fire capability, through proper selector training and command control, ammunition will not be wasted, and the increase in logistics will be negligible (Rifle Squad and Platoon Evaluation Program, 22 May 1961-31 July 1961, United States Army Infantry School). Another problem associated with automatic fire is the ability of the rifleman to carry sufficient ammunition on his person to permit employment of his weapon in the automatic role. This problem is not just related to the weight of ammunition, but to the bulk of the load carried.

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3. (CONFMOD) Machineguns.

- a. Even though every rifleman has an automatic fire capability a requirement still exists for an automatic weapon with an increased sustained firepower capability out to ranges of 1100 meters. This requirement is satisfied by the machinegun. A primary reason supporting this consideration is to provide equality of fire potential with Soviet counterpart weapons. Three of those weapons are:
- (1) Squad 7.62mm light machinegun - effective range - 800 meters.
 - (2) 7.62mm company light machinegun - effective range - 1000 meters.
- b. Secondly, a weapon with an 1100 meter effective range capability more readily satisfies defensive fire requirements in support of the squad in breaking up attacking formations at maximum ranges; ranges sufficiently far forward of the FEBA to permit the effective delivery of mortar and artillery fires. Machineguns will be required to fire prearranged fire data (such as final protective lines (FPL)) which cannot be accomplished by automatic rifles. In the attack, the machinegun, because of its inherent characteristics, is able to deliver closer and more accurate overhead and supporting fires (particularly at long-r ranges) than automatic rifles.
- c. The machinegun also is used to great advantage in the delivery of mutually supporting, interlocking bands of fire. As such, the machinegun is the primary automatic weapon about which defenses are organized.
4. (CONFMOD) Summary. In summary, automatic rifles will be employed to deliver accurate and effective aimed area fires out to ranges of at least 400 meters and at even greater ranges, lethal fires with reduced accuracy and effectiveness. The automatic fire capability is required primarily in the defense role against "human sea" type attacks by Infantry personnel in the attack and defense in close terrain situations (similar to those experienced in Vietnam). The machinegun will be employed during the conduct of offensive and defensive operations. In the offensive, it will be used primarily as the automatic weapon base of the fire element for maneuvering forces. In the defense it will deliver the long range automatic fires required to break up attacking formations, and will serve as the automatic weapon foundation in the organization of defensive positions. Whether every man in the squad or


only two men in a squad have automatic rifles, a requirement for an automatic weapon (machinegun) with an effective range of 1100 meters will still exist. An 1100 meter range capability not only matches Soviet machinegun capabilities, but provides fires out to the maximum effective range the machinegunner can see and adjust fires on target. (Infantry Reference Data, ROAD, September 1962, United States Army Infantry School).

APPENDIX III - Grenade Launcher Requirement - to ANNEX C to Study (Rifle Evaluation) 8 December 1962

1. This appendix contains a discussion of the need for a grenade launcher on each rifle.
2. There is a requirement for the weapon of each soldier in the Infantry squad to possess a capability to deliver high explosive fragmentation fires. In defensive situations this capability would provide the squad with a responsive area fire weapon to cover both flanks and the enemy avenues of approach into the squad's position. Also, it would provide the capability of covering dead space between maximum hand grenade range and out to ranges of 400 meters as well as those gaps in interlocking machinegun fires (and rifle fires) created by vagaries in the terrain. To cover those gaps in fires delivered by the individual Infantryman in the squad, the weapon should have an effective range of 400 meters; the minimum effective range of the rifle. In the attack, the firepower of the squad would be augmented materially.
3. None of the current rifles have an adequate grenade launching capability satisfying military requirements. Neither the desired range of 400 meters nor accuracy of fire requirements are fulfilled. Therefore, to satisfy the need for a responsive grenade launching capability, the Infantry squad must be equipped with the M79 grenade launcher.
4. The placement of two M79 grenadiers in the rifle squad has proven highly satisfactory (Rifle Squad and Evaluation Program, 22 May - 31 July 1961, United States Army Infantry School; United States Army Combat Developments Experimentation Center Squad Test). If every rifleman had a grenade launching capability similar to the M79, and as envisioned with the development of the Special Purpose Individual Weapon, improved effectiveness of the rifle squad would be achieved. However, until such a capability is developed for the rifleman, the M79 will continue to be required as a squad weapon.

APPENDIX IV - Firing from Within Armored Personnel Carrier Requirements -
to ANNEX C to Study (Rifle Evaluation) 8 December 1962

1. This appendix contains a discussion of the need for a "firing from within" capability for the armored personnel carrier (APC). That is, providing personnel riding within the APC with a capability of employing their weapons while riding in the vehicle.
2. The United States Army Infantry School (USAIS message to United States Continental Army Command, AJIIS-R 12-14-A, 16 December 1961) visualizes a requirement for only a limited firing capability from within the carrier and then for emergencies primarily. (By limited is meant the capability for about two individuals, not including the vehicle commander, to fire from within the APC by use of its hatches.) An example would be firing from the carrier when ambushed and the situation not favoring the dismounting of the squad to close with the enemy on foot. Infantry opinion is based on the reasoning that the APC is only a means of providing protected transport to personnel and cargo. The APC is not considered to be a fighting vehicle. Neither its vehicular armament nor its limited armor protection permit use of the APC as such. Additionally, it is virtually impossible to deliver accurate fire from a moving vehicle; particularly a vehicle traveling cross-country.
3. Ideally, a rifle designed for use by personnel to fire from within a carrier would be lightweight, short in overall length, easy to handle with minimum straps, handles and protrusions to catch on parts of the vehicle, and have an automatic fire capability for the delivery of area type fires.

APPENDIX V - Bayonet Requirement - to ANNEX C to Study (Rifle Evaluation) 8 December 1962

1. This appendix contains a discussion of the need for the rifle to accept the bayonet and the effect of the extra weight on combat operations.
2. Research data generally indicates that the bayonet is very seldom used in combat. The enemy is killed by all types of weapons fire but only in isolated instances has the bayonet contributed significantly to killing enemy personnel. However, these research documents also point out that the psychological influence of the bayonet, both on the attacker and the defender, cannot be determined. Therefore, no true statistical conclusions as to the merits of the bayonet can be presented.
3. However, since the rifles under discussion now possess the capability of accepting the bayonet, and there exists a requirement for its use in riot control and civil disturbances, this capability should be retained.

APPENDIX VI - Impact of Using a 5-7 man Squad - to ANNEX C to Study
(Rifle Evaluation) 6 December 1962

1. This appendix contains a discussion of the impact of using a five to seven man squad on the military requirements for a rifle.
2. A five to seven man squad armed with any of the weapons considered in this study is unacceptable to the Infantry because it lacks staying power. A five to seven man squad is too small to provide the degree of continuity of action required in small unit operations. Loss of one or two men as casualties would be tantamount to loss of an effective squad. Even if a responsive replacement system could provide personnel required to replace battlefield losses, the teamwork, esprit, morale and cohesiveness of the squad would be impaired. Consideration also must be given to the relatively larger percentage of firepower lost if one man becomes a casualty in a small squad as compared to a large squad. The staying power of the small squad would be radically lessened by such an occurrence. Even if a five to seven man squad could be armed with weaponry that would match or surpass the firepower capability of larger squads, it still would be unacceptable because of its inability to accept casualties.
3. Since a five to seven man squad would be unable to occupy and defend frontages equal to those of a larger squad armed with identical weapons, more small squads would be required. This would introduce problems of control at the platoon level as well as effect the overall efficiency of operations for use of a squad leader to control only four, five or six other personnel would be an uneconomical use of the average squad leader's capabilities.
4. The Infantry objective of improved squad weaponry should be to increase the firepower capability of the Infantry squad rather than attempt to maintain a theoretical squad status quo with reduced personnel.

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ANNEX D - Doctrine, Tactics, Organization and Equipment of Communist Bloc
Basic Combat Units - to Study (Rifle Evaluation) 8 December 1962

1. (U) General. The Communist Bloc empire comprises a massive and impressive array of military strength. Generally, the countries contributing to this strength have well-trained and equipped armies. For the most part, equipment is that which has been furnished by the dominant power, the USSR. Doctrine, tactics and techniques employed also are based on Soviet philosophy. The Communist empire is world-wide and any one, or all of the countries, are potential opponents of the United States. Of the approximately ten major countries within the Soviet sphere of influence, the ones which constitute the major threat to US forces are the USSR and Chinese Communist armed forces. A brief examination of each of these military forces at the lower combat echelon is relevant and appropriate to the problem under study.
2. (CONFMOD) Doctrine, Tactics, Organization and Equipment.
 - a. USSR.
 - (1) Soviet Infantry missions and characteristics are similar to those of the US Army. Infantry is the arm of close combat which fights by combining fire, maneuver and shock action.
 - (2) The Soviet motorized rifle squad is the basic Infantry unit. Normally, it fights as part of the rifle platoon but may engage in independent action during offensive operations. It accomplishes its mission in a similar manner to the US Infantry squad. The Soviet rifle squad uses fire and movement, organic weapons and grenades and, when required, hand-to-hand combat. In the attack, as part of the platoon, the squad moves by phases from the line of departure to the assault position. When advancing on objectives 250 to 300 yards away, the squad covers the first 150 to 200 yards at a fast walk if enemy fires permit. The last 100 yards are made on the run. The attack also may be made by running when the objective is 150 to 200 yards away. The squad leader employs his automatic weapons as a base of fire to support the movement of individual riflemen. Assault action is violent, accompanied by shrieks, vengeance and firing rifles, submachineguns and light machineguns in the squad while on the move. When used in a mobile attack in

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armored carriers, the squad normally dismounts in a covered departure position as close to the objective as possible prior to launching the assault. Against lightly defended positions, the squad may remain mounted in carriers and conduct the attack. Movement is accompanied by direct fire available from vehicular mounted and individual weapons.

- (3) In defensive operations, the squad defends a front of 40 to 50 yards in the platoon sector. An assigned zone of fire is covered by the combined fires of squad weapons. The heaviest fire from the squads of the platoon is concentrated approximately 400 yards to the front and flanks. Defensive fires increase in intensity as the enemy approaches the assault position. The Soviets believe that current armament in the rifle company is most effective at ranges of 400 meters. If the enemy continues to advance, the squad begins to fire point blank fire and use grenades as the attack continues to 25-30 yards from the main line of resistance. The squad tries to repel the enemy by fire, obstacles and hand-to-hand combat. When the enemy assaults with tanks, squad antitank weapons direct fire at tanks while other men in the squad deliver fire against accompanying Infantry.
- (4) The Soviet squad consists of eight men. In addition to the squad leader, there is a two man light machinegun team, an antitank grenadier and four riflemen. All members of the squad, except the light machinegunners, are armed with an AK-47 submachinegun. The light machinegunner carries the 7.62mm light machinegun (RPD). The antitank grenade launcher is the RPG-2, 80mm grenade similar to the German World War II weapon. Principal characteristics for each of these weapons are:
- (a) AK-47 submachinegun. Fires semiautomatic or automatic rifle fires selectively from a 30 round magazine. Weapon weight with magazine is 10.49 pounds. It fires a 7.62mm bullet. When firing short bursts of automatic fire, best results are obtained at 300 meters. In the semiautomatic mode, effective range is 400 meters with well-trained riflemen obtaining hits up to 600 meters.

(b) Light machinegun, 7.62mm (RPD). A man-portable machinegun with a cyclic rate of fire of 650-750 rounds per minute. It weighs 19.89 pounds and has an estimated effective range of 800 meters.

(c) Antitank grenade launcher, RPG-2. This weapon consists of a launcher tube of 40mm size and a projectile, which is muzzle loaded, of 80mm. It is a recoilless, percussion fired grenade with an effective range of 100-150 meters.

b. Chinese Communist.

- (1) The doctrine, tactics and equipment of the Chinese Communist Army have been influenced strongly by the Soviet Union. Since the ground force is primarily an Infantry army, tactics are designed to exploit Infantry capabilities. Offensive operations begin with the approach march and occupation of attack positions. In Chinese doctrine the attack phase begins with departure from company attack positions and ends with occupation of the assault position. Assault positions are located as close as possible to the objective and are disposed to permit simultaneous assault from different directions. The assault phase ends when the initial objective has been overrun and consolidated.
- (2) The Chinese use both the position and mobile defense, but favor the mobile defense. Combat security positions are established 4-6 kilometers forward of the main line of resistance. The conduct of the defense is similar to that of the Soviet small unit.
- (3) Weapons are modeled after Soviet type weapons. Primary small arms weapons consist of the Soviet SKS 7.62mm carbine (Chinese type 56) and the Soviet AK-47 rifle (Chinese type 56 assault rifle). In the future, it is believed that SKS carbine production will be discontinued in favor of the AK-47. The standard squad machinegun is the Soviet 7.62mm light machinegun (RPD). Antitank weapons are a rocket launcher and two recoilless rifles, all Chinese made but based on post World War II US designs.

- c. (1) The discussion above relates primarily to potential conventional enemy forces and does not take into consideration enemy guerrilla forces. Our greatest

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threat today from this type of enemy is in Southeast Asia where Communist China exerts a tremendous influence on the characteristics of military doctrine. Much of the success achieved by the Viet Minh against the French is a result of adoption of tactical doctrine which the Chinese Communists had perfected against the Chinese Nationalist forces.

- (2) Initially, infiltration and attrition are employed to harass the enemy, keep him off-balance, and capture the arms and equipment necessary for building the reserve force with which more sophisticated maneuvers can be executed. The Communists avoid pitched battles and resort to frontal attacks only when the enemy is cut off and they have overwhelming superiority in numbers. As the guerrilla force becomes more proficient and better armed, it emerges into a well-organized effective organization employing military doctrine which is characterized by:

- (a) Mobility.
- (b) Detailed advanced planning and decentralized execution.
- (c) Psychological and political preparation of the population.
- (d) Surprise.
- (e) Deception.
- (f) Concentration of effort.
- (g) Adaptability.

- (3) These forces generally will be armed with a wide variation of individual weapons seized during the conduct of ambushes and other operations. However, these forces are supplied with weapons from both the USSR and the Chinese Communist Armies.

- d. Communist Bloc countries such as East Germany, Poland, Czechoslovakia, North Vietnam and North Korea are dependent on the Soviets and Chinese for the majority of their military equipment. Their conventional forces will employ basically the same doctrine and tactics as the two dominant powers. Weapons also will provide basically the same offensive and defensive firepower capabilities.
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ANNEX E - Comparative Tactical Evaluation of Competing Rifles - to Study
(Rifle Evaluation) 8 December 1962

1. (U) General. The rifles considered and evaluated as to their potential application in tactical situations include the M14, M14 (modified) and M14 (USAIB), the Armalite AR-15, the Soviet AK-47 and the developmental Special Purpose Individual Weapon (SPIW). The evaluation was objective in nature and is based on currently available information contained in reports of test, intelligence documents, statistical data obtained through firing tests by the United States Army Infantry Board and physical examination of the respective weapons.
2. (S) Discussion.
 - a. M14 Rifle. The M14 7.62mm rifle is the standard individual weapon currently issued to the United States Army Infantry squad. When produced and issued to field units, a selector knob to permit an automatic fire capability is provided with the weapon. The decision to install the selector knob is at the discretion of the major unit commander. The M14 (modified) is basically the same weapon as the M14. The differences are the installation of an automatic fire selector knob and a bipod to provide stability when firing automatic fire. The M14 (USAIB) rifle is a product improvement of the M14 (modified). The standard stock of the M14 (modified) is replaced with a new design stock which incorporates a hand grip at the fore end of the rifle stock, a pistol grip to the rear of the trigger group, a straight comb stock with a rubber recoil pad, and a compensator has been substituted for the flash suppressor. The purpose of the hand grip is to exert increased torque on the rifle and increase bipod footprint ground pressures. The combination of hand grip and pistol grip permit the firer to achieve greater accuracy during automatic fire. Physical characteristics of the M14 (modified) and M14 (USAIB) are shown in Appendix I.
 - b. Armalite AR-15. The Armalite AR-15 is a small caliber (.223), rifle manufactured by Colt Patent Arms Manufacturing Company. It possesses a selective capability for either semiautomatic or automatic fire. A bipod is provided for stability in firing. Physical characteristics as compared to M14 and AK-47 rifles are shown in Appendix I.

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- c. AK-47. The AK-47 Soviet rifle is of 7.62mm caliber. Although referred to in this study as a rifle, many intelligence documents refer to the weapon as a submachinegun. The AK-47 is the basic individual weapon of the Soviet rifle squad. The rifle can be fired selectively in either semiautomatic or automatic fire. In addition to being the primary weapon of Soviet Infantry, it is used extensively in the Chinese Communist Army, the North Vietnamese Army and many other Communist Bloc Armies.
- d. Special Purpose Individual Weapon (SPIW). The SPIW combines the point fire capability of the rifle and an area target, or high explosive fragmentation capability, into a single hand-held, shoulder fired weapon. A requirement for a weapon of this type has been established and approved military characteristics have been developed. The feasibility of developing the weapon has been established and industry has been invited to participate in the development program. The SPIW combines into a single weapon a high velocity, small caliber projectile for point fire and a 30-40mm dual purpose, antipersonnel, anti-materiel projectile for area fire. It is expected to be type classified in FY 1966. Ultimately, it may replace all small arms weapons in the Army with the exception of the light machinegun and a few pistols. The United Kingdom and Canada have expressed an interest in this developmental program. This interest was reconfirmed as recently as the Fifth Tripartite Infantry Conference which convened at Fort Benning, Georgia, on 5-10 November 1962. Tentative physical characteristics as contained in technical specifications and design concepts are shown in Appendix I.
- e. Each of the weapons under consideration has been analyzed to determine its potential for fulfilling the requirements of the Infantry for a shoulder fired, small arms weapon. The following tactical and human engineering aspects have been considered as related to each weapon and discussion of the attributes and merits is contained in Appendix II of this Annex.
- (1) Physical characteristics.
 - (2) Range, accuracy and penetration.
 - (3) Position disclosing effects.

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- (4) Human factors.
 - (5) Environmental and climatic conditions.
 - (6) Grenade launching capability.
 - (7) Automatic shoulder fire weapons versus machineguns.
 - (8) Employment of small arms from armored personnel carriers (APC).
 - (9) Capability of using bayonet.
 - (10) Logistical aspects.

3. (S) Conclusions. Based on the analysis at Appendix II, the following conclusions are made with respect to the attributes, merits and capability of each weapon to meet Infantry tactical requirements:

- a. Of the weapons currently available and tested, the M14 (USAIB) is the most preferable rifle from the standpoint of meeting military requirements.
- b. The AR-15 demonstrated many desirable characteristics and features. In some aspects it is superior to the M14 (USAIB) and other tested weapons. Although it compared favorably with the M14 (USAIB) at ranges out to 400 meters, inaccuracy during combat firing and insufficient lethality at ranges greater than 400 meters eliminated the AR-15 from consideration as the most desirable weapon.
- c. The AK-47 demonstrated acceptable capabilities at close ranges and can be classified in a category of submachinegun. In no way does the AK-47 fulfill individual weapon requirements as an individual weapon for the US Army Infantryman.

APPENDIX I - Physical Characteristics - to ANNEX E - Study (Rifle Evaluation)
8 December 1962

PHYSICAL CHARACTERISTICS

M14

AR-15

M14(M)

(USAIB)

AK-47

SPW*

| | | | | | |
|---|----------------------|------------|------------|----------------------|----------------------|
| Overall Length | 39 in | 44.31 in | 44.31 in | 34.25 in | 40 in |
| | | | | | (6.06 pt wpu) |
| Weight of Rifle | 6.55 | 9.84 | 9.94 | 8.44 | 5.66 (3.00 area wpu) |
| Weight of Rifle w/Bipod | 7.12 | 11.59 | 11.69 | No Bipod | Minimum |
| Automatic Fire Capability | Yes | Yes | Yes | Yes | Controlled Bursts |
| Semiautomatic Fire Capability | Yes | Yes | Yes | Yes | Yes - Point |
| Cyclic Rate | 750RPM | 700-750RPM | 700-750RPM | 600RPM | 2000RPM |
| Caliber of Ammunition | .223 | 7.62mm | 7.62mm | 7.62mm | .22 |
| Muzzle Velocity | 3300FPS | 2800FPS | 2800FPS | 2329FPS | 4700FPS |
| Weight of Bullet | 55 grains | 147 grains | 147 grains | 122.68 grains | 110 grains |
| | | | | | Flechette |
| | | | | | 91 grains |
| Weight of Cartridge | .40 ounces | .90 ounces | .80 ounces | .59 ounces | .563 lbs area r |
| Size of Magazine | 4-13/16x2-7/16x13/16 | 6-3/16x3x1 | 6-3/16x3x1 | 9-12/16x2-9/16x15/16 | Unknown |
| Weight of Loaded Magazine | .75 lbs** | 1.50 lbs** | 1.50 lbs** | 2.05 lbs** | .716 lbs *** |
| Weight of Rifle w/Loaded Magazine | 7.30 | 11.34 | 11.44 | 10.49 | 9.776 |
| Weight of Rifle w/Bipod and Loaded Magazine | 7.87 | 13.09 | 13.15 | No Bipod | 10 pounds |

*Technical specification

**20 round magazine

***30 round magazine

***60 rounds point fire and 3 rounds area fire

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APPENDIX II - Relative Attributes, Merits and Capabilities of Each
Weapon to Meet Infantry Tactical Requirements - to ANNEX E to
Study (Rifle Evaluation) 8 December 1962

1. (U) Physical Characteristics.

a. The salient physical characteristics for each weapon are compared in tabular form at Appendix I.

b. Conclusions. Based on an analysis of the data contained in Appendix I it is concluded:

(1) The Special Purpose Individual Weapon (SPIW) as currently envisioned best meets the physical characteristics and objectives of the Infantry. The weapon will combine point and area fire capability within a very acceptable weight classification.

(2) When considering only the weight characteristic for an interim small arms weapon, the AR-15 is lighter than the M14 or AK-47 rifles. All of the interim rifles meet minimum physical requirements for a semiautomatic/automatic fire small arms weapon.

2. (C) Range, Accuracy and Penetration.

a. Evaluation.

(1) Range. The M14, AR-15 and AK-47 are capable of meeting the minimum range requirement of 400 meters.

(2) Accuracy.

(a) The M14 (modified), the M14 (USAIB), the AR-15 and the AK-47 have been test fired.

1. The M14 (modified) and the AR-15 were fired at 100, 200, 300, 400, 500 and 600 meter known distance ranges. Firing in the semi-automatic mode was conducted using both a sandbag rest and the weapon bipod. Results of firings are shown at Inclosure 1. These shot groups are representative and indicate fairly tight groups which would be lethal to personnel at these ranges. However, one point must be considered. The groups are

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not related to an aiming point. This is particularly important because difficulty was experienced with the AR-15 in retaining a fixed aiming point to center the shot groups. The relatively lightweight barrel of the AR-15 has a tendency to bend when pressure is applied to secure the weapon in the firing position.

2. The known distance automatic fire accuracies of the AR-15, M14 (modified) and the M14 (USAIB) have been tabulated and are shown at Inclosure 2. Figures indicated in parentheses following the percentage of hits obtained indicate the number of individuals firing the particular course. All other firing was conducted by five individuals. Analysis of the results reveal:
 - a. In the kneeling and standing positions at 25 meters the AR-15 and M14 (USAIB) were approximately equal in shot spread and superior to the M14 (modified).
 - b. At 50 meters the same results in a, above, were evident in the two different firing positions.
 - c. At 75 meters the same results were obtained; however, neither the AR-15 nor the M14 (USAIB) were able to achieve a shot group when 5-10 round bursts were fired.
 - d. Using two different positions, bipod and sandbag, at 100 meters the AR-15 and M14 (USAIB) were superior to the M14 (modified). The M14 (USAIB) was marginally better than the AR-15 particularly in that it placed 100% of the rounds in a 6'x6' target.
 - e. At 200 meters under the same firing conditions, the AR-15 and M14 (USAIB) were approximately equal and superior to the M14 (modified).
 - f. At 300 and 400 meters, firing 2-3 round bursts from bipod and sandbag positions,

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the M14 (USAIB) percentage of hits on all targets was greater than the AR-15. The AR-15 was better than the M14 (modified).

3. In addition to known distance firing, field target firing ranges at Fort Benning were used to determine combat firing accuracies. Five rifle squads of six riflemen and two automatic riflemen were employed in the combat firing. The organization chosen is a duplication of the ROAD Infantry squad with exception of the two M79 grenadiers. Combat firing was conducted in both day and night offensive and defensive situations. One significant fact was apparent during conduct of the night offensive and defensive operations. Tracer ammunition available in the NATO 7.62mm cartridge adds significantly to the hit capability of the squad at night. For purposes of test firings the candidate weapons, AR-15, M14 (modified) and M14 (USAIB) were initially fired with ball ammunition only. Subsequent to this, night combat conditions were simulated and firing was accomplished using tracer ammunition. For the M14 (modified) rifle an increase of 64.95% was noted and for the M14 (USAIB) an increase of 67.33%. At Inclosure 3 is tabulated data on squad firing tests for each combat situation.

- (b) Only a small amount of ammunition was available for test firing the AK-47. Firing was conducted both semiautomatically and automatically. The AK-47 does not have provisions for a bipod. Semiautomatic firing was conducted using a sandbag supported position at ranges of 100, 200, 300, 400 and 500 meters. Results of firing are shown at Inclosure 4. It should be noted that at all ranges the AK-47 was inferior in accuracy to the M14 and AR-15 fired from sandbag positions. Automatic fire at ranges of 75 meters or less in an unsupported position was acceptable, but was not effective beyond 100 meters. Technical firing tests conducted in 1955 by Development and Proof Services, Aberdeen

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Proving Ground, substantiate these findings. At that time it was concluded that the AK-47 compared favorably with other military rifles in use when fired semiautomatically. The AK-47, when fired automatically, achieved accuracies comparable to, and expected of, submachinegun weapons.

(3) Penetration.

- (a) The ability of a projectile to penetrate various targets is a function of impact velocity and projectile design. The Infantryman in combat is confronted with many different target materials. They range from unprotected individuals through the spectrum of individuals protected by clothing and equipment, hasty field fortifications, light, unarmored vehicles and cities, towns and other built-up areas. The defeat of these various targets is vital to the individual and the squad in accomplishing their combat mission.
- (b) The projectile fired by the M14 rifle is the standard 7.62mm NATO (M80) ammunition. It is a 147 grain bullet fired at a muzzle velocity of 2800 feet per second. It is designed with a lead core and a thin gilding metal jacket. Caliber .223 ammunition fired from the AR-15 has a muzzle velocity of 3300 feet per second and is of the same design as the 7.62mm projectile. The 7.62mm AK-47 projectile is constructed of a steel core and steel jacket. Muzzle velocity is 2329 feet per second. Both the caliber .223 and 7.62mm NATO projectile are easily deformed and as a result tumble easily within the target body. This permits a greater release of energy within the target. With the steel core and steel jacket, the Russian 7.62mm projectile remains relatively stable in semisoft targets and achieves greater penetration up to ranges of 200-300 meters, after which penetration depth falls off in comparison with other projectiles. However, against hard targets the Russian 7.62mm projectile tumbles. At Inclosure 6 is data obtained from comparative firings of all three projectiles and at ranges

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of from 100-600 meters. From the results obtained, it is evident that the 7.62mm NATO projectile has significantly greater penetrative power against the selected target array than the caliber .223 or Russian 7.62mm projectiles.

b. Conclusions.

- (1) The AR-15 and M14 are approximately equal in capability with respect to range and accuracy during semi-automatic firing out to ranges of 400 meters. Considerable difficulty was encountered in attempting to center the shot group of the AR-15 at ranges of 400-500 meters.
- (2) In automatic firing against targets at ranges of 25, 50 and 75 meters the AR-15 and the M14 (USAIB) produced shot groups of approximately the same size and were superior to those of the M14 (modified). The AK-47 had acceptable accuracy at these ranges.
- (3) In automatic firing from prone supported positions at ranges of 100-400 meters, accuracy of the M14 (USAIB) was better than the AR-15. At 200 meters the AR-15 and M14 (USAIB) were approximately equal and superior to the M14 (modified). At ranges of 300-400 meters when firing 2 to 3 round bursts the M14 (USAIB) percentage of hits was greater than the AR-15 and the AR-15 was greater than the M14 (modified).
- (4) At all ranges tested, the penetrative power of the 7.62mm NATO cartridge fired by the M14 is superior to that of the AR-15 caliber .223 and the Russian 7.62mm ammunition. Target penetration against semi-hard targets was achieved by the M14 ammunition at ranges greater than the AK-47 and AR-15.


3. (C) Position Disclosing Effects.

a. Evaluation.

- (1) In reports of test by the United States Army Infantry Board in May 1958 and the Arctic Test Board in April 1959 comparative evaluation was made concerning the ability of an observer to detect smoke or flash from the M14 and AR-15 at various ranges. Tests were

| <u>AR-15</u> | <u>M14</u> | <u>Background</u> | <u>Light</u> | <u>Object Detected</u> |
|--------------|------------|-------------------|--------------|------------------------|
| 350-500 | 300-400 | White | Day | Smoke |
| 750-850 | 175-300 | Dark | Day | Smoke |
| 40 | 16 | White | Night | Sparkler |
| 82 | 30 | Dark | Night | Sparkler |

| <u>AR-15</u> | <u>M14(M)</u> | <u>M14(USAIB)</u> | <u>AK-47</u> | <u>Light</u> | <u>Object Detected</u> |
|--------------|---------------|-------------------|--------------|--------------|--------------------------|
| 40-50 | 40-50 | 40-50 | 40-50 | Day | Muzzle blast |
| 100-150* | 100-150* | 100-150* | 100-150* | | effect on dust, grass |
| 100 | 100 | 100 | 100 | Day | Muzzle smoke |
| 100 | 100 | 100 | 100 | Day | Muzzle flash |



| <u>AR-15</u> | <u>M14 (M)</u> | <u>M14 (USAIB)</u> | <u>AK-47</u> | <u>Light</u> | <u>Object Detected</u> |
|--------------|----------------|--------------------|--------------|--------------|------------------------|
| 75-100 | 100-125 | 175-200 | 225-250 | Night | |
| 200-225* | 225-250* | 300-375* | 350-375* | | |

*Indicates that 6x30 binoculars were used.

(3) Test firing of the AK-47 by Aberdeen Proving Ground resulted in detection of sparklers from the muzzle during night firing. No detection ranges were expressed. The AK-47 is not equipped with a flash suppressor.

b. Conclusions. Based on the most recent test data available, the AR-15 is the most difficult of all weapons to detect with respect to muzzle effects at various ranges. The M14 rifle could be detected at longer ranges with both the unaided eye and binoculars.

4. (C) Human Factors.

a. Evaluation.

(1) The M14 (modified) and the M14 (USAIB) are the heaviest weapons of the ones evaluated. The AR-15, being the lightest weapon, can be carried for longer periods of time without fatiguing effects. When comparable weight loads are transported by the individual, the soldier armed with the AR-15 can carry a total of 15 loaded magazines of 20 round capacity as compared to only 5 magazines of 20 round capacity with the M14. However, the bulk of the 15 AR-15 magazines does not permit easy transport since there is insufficient space on the soldier's equipment to attach the magazines. Although the extra ammunition could be carried in currently available factory packed bandoleers, this is undesirable. Combat situations require, at times, sufficient loaded magazines to sustain the individual through a particular situation. The requirement for the individual soldier to recharge magazines is most undesirable from the tactical aspect. This situation is true when applied to the M14 rifle also. A definite requirement exists for factory packed magazines which are expendable and may be carried in a light cloth bandolier.

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- (2) The AR-15 during firing has the disadvantage of ejecting empty cartridge cases in the four o'clock direction relative to the gun barrel. For a normal right handed firer, this ejection may be disconcerting. When fired by a left handed firer, the empty case tends to lodge in the neck of clothing. This disadvantage is supported by previous tests of the AR-15 as well as current tests being conducted.
 - (3) From an environmental aspect, the AR-15 previously was considered as undesirable when wearing arctic clothing. Difficulty was experienced with riflemen attempting to fire while wearing arctic mittens and intermediate arctic handwear. Frostbite on the face also was experienced in temperatures of -20°F because of the fiberglass stock of the rifle. Test personnel had no difficulty in firing the M14 when the rifle was equipped with the Colley Type winter trigger.
 - (4) The AR-15, because of its smaller caliber and lower cartridge specific impulse, has lower recoil forces than the M14 (modified) and M14 (USAIB). This low recoil results in ease of firing in the automatic mode. On the other hand, the M14 (modified) with a high cartridge specific impulse and recoil degrades the automatic fire ability of the average soldier. Firing experience has resulted in bruised shoulders and cut lips. Installation of a compensator on the M14 (USAIB) rifle has reduced these undesirable effects significantly.
 - (5) A comparison of safety aspects of the AR-15, M14 (modified) and M14 (USAIB) indicates that these weapons are generally acceptable and safe. The AK-47 is undesirable from the safety aspect in that the bolt cannot be retained open. This feature also is undesirable in combat firing since it gives the firer no indication as to the expenditure of the last round of ammunition.
 - (6) Handling of the different rifles indicates that the AR-15 can be handled easier with one hand than other weapons. The configuration of the pistol grip located at, or close to, the rifle center of gravity, tends to facilitate carrying, pointing from the hip while firing and general handling ability of the weapon. The AK-47 has some of the

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same desirable features although weight and general configuration was not as satisfactory as the AR-15. The M14 due to weight and length was the least desirable although pointing and aiming of the weapon at a target during shoulder firing was better than the AR-15 or AK-47.

- (7) When used by airborne troops, the AR-15 appears to be easily secured and does not create a bulky item of equipment. The shorter overall length of the AR-15 decreases the amount of contact with the body and does not hinder body movement to an unacceptable degree.
- (8) Although not properly a part of this rifle evaluation, the M14 (USAIB) rifle modified with a folding stock apparently will solve many of the human engineering shortcomings of the weapon while not affecting firing characteristics. In this configuration the weapon is as satisfactory as the AR-15 from human engineering respects.

b. Conclusions.

- (1) From the data available the AR-15 appears to be suitable from the human factor aspect when the following attributes are considered:
 - (a) Light weight.
 - (b) Shorter overall length than M14 type rifles.
 - (c) Amount of ammunition which can be carried by an individual as compared to an equivalent weight of M14 rifle ammunition. However, bulk of the loaded magazine is a problem and will be until such time as factory loaded expendable magazines in bandoleers become available.
 - (d) Lower recoil forces are more acceptable from the standpoint of fatigue.
 - (e) Parachute delivery of the AR-15 when attached to an individual appears to be more acceptable than with the M14 rifle.

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(f) General handling characteristics are slightly better than the AK-47 or M14.

(2) Based on previous environmental tests the M14 can be fired more easily by personnel in arctic type clothing.

(3) Shoulder pointing of the M14 is easier and more accurate.

5. (C) Environmental Conditions.

a. Evaluation.

(1) Only the M14 (modified) and the AR-15 were tested previously under varying environmental conditions. Both were tested in 1959 under temperate climatic conditions. Some environmental testing of the AK-47 was conducted in 1955 by Ordnance Technical Intelligence, Development and Proof Services, Aberdeen. Results of previous tests are:

(a) The AR-15 and M14 were subjected to five day periods of no cleaning, exposure to rain, muddy water, sand, dust and temperatures of -25°F and 125°F under temperate climatic test conditions. Both rifles were comparable in performance under all conditions except muddy water, sand and dust. Neither of the rifles functioned properly when exposed to these conditions. However, the AR-15 had a lower percentage of malfunctions per 100 rounds fired under most situations than the M14.

(b) In the arctic environmental test, the AR-15 and M14 were subjected to cold-soaking in the open at temperatures ranging from 8°F to -24°F for varying periods of time, then warmed at ambient temperatures of 70-75°F. The rifles also were buried in snow and exposed to blowing snow and glacial dust. Firing was conducted at ambient temperatures ranging from 17° to -8°F. The AR-15 experienced more malfunctions during this test than did the M14. Computations made from the four test phases indicate that approximately 1060 rounds were fired from each weapon. The AR-15 had approximately 50 malfunctions from the following causes: 1) failure to go in battery; 2) failure to feed; or 3) failure to

- AR-15 M14

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at a time when maximum firepower is required. The weapon appears to be well suited for use by Special Forces personnel where requirements for lightweight, effectiveness at close ranges, and ease of transport are paramount. The M14 (USAIB) has the disadvantage of weight and length when compared under these environmental conditions. However, for tactical employment in most areas of the world where ranges are greater and more hard targets are encountered, the M14 is superior in range and penetrative power. The M14 from the standpoint of reliability is superior.

b. Conclusions.

- (1) The AR-15 experienced a higher percentage of malfunctions under arctic conditions and recent temperate climate testing than did the M14 rifle.
- (2) While the AR-15 appears to be well suited in certain geographical areas such as the jungle, the M14 (USAIB) is more adaptable and better suited for employment in the majority of other world areas.

6. (S) Grenade Launching Capability.

a. Evaluation.

- (1) Each of the candidate weapons with the exception of the AK-47 has a grenade launching capability. The M14 (modified) and M14 (USAIB) require attachment of the M76 grenade launcher to achieve this capability. The M76 launcher, when installed on the M14, fires the M31 rifle grenade. A sight, M15, is also attached to the left side of the rifle for aiming purposes. The M31 grenade is classified as a high explosive, antitank grenade. Maximum range, when fired from the M14, is listed as 275 meters. However, recent firing at Fort Benning produced a maximum range of only 215 meters. By using an adapter on the M76 launcher, the M26A2 fragmentation grenade can be fired to a range of 160 meters. This range is a function of grenade fuzing time of 4.5 seconds.
- (2) The AR-15 rifle muzzle is configured to accept the M31 rifle grenade. This eliminates any requirement for a rifle grenade launcher. Ranges achieved when

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firing the M31 grenade were in the order of 194 meters. The weapon does not provide any suitable sight arrangement for aiming purposes. The recommended technique of firing is to place the rifle butt on the ground with the weapon inclined at an angle of 45° to the horizontal. This inclination provides maximum range. Shoulder firing of the weapon with the rifle grenade produces severe recoil forces and unacceptable side effects. Although the weapon can be fired semiautomatically with the rifle grenade by using the special cartridge in the rifle magazine, this advantage is not considered to be of significant importance.

- (3) In discussing requirements for grenades to support squad operational concepts, a range requirement of 0-400 meters has been established. The M79, 40mm grenade launcher now in operational use meets this requirement. Unloaded weight of the weapon is 6 pounds and it fires a 40mm projectile effectively to ranges of 350-400 meters. The bursting radius of the projectile is 5 meters with lethality extending for some distance beyond. Two M79 launchers are organic to the Infantry squad thereby eliminating any requirement for additional rifle grenade launchers. Developmental effort is now under way to combine an antimateriel capability into the same projectile used against personnel.
- (4) The objective in developing Infantry small arms weapons is to combine the point fire, small arms direct fire capability, and the area fire, high explosive fragmentation grenade, in a single weapon. The SPIW is being developed to meet this requirement. When available, this weapon initially will replace the M79 and as production permits will become the standard small arms weapon of the Infantry. As such, it will replace all small arms weapons now in use with the exception of the machinegun and a few pistols.

b. Conclusions.

- (1) Currently the M79 grenade launcher meets Infantry requirement for a grenade launcher with a range of 400 meters.
- (2) The Special Purpose Individual Weapon is the ultimate small arms weapon for the Infantry squad and

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developmental effort should be expedited to provide point and area fire capabilities.

7. (C) Automatic Shoulder Fired Weapon versus Machineguns.

- a. Evaluation. In automatic fire, the AR-15 and M14 (USAIB) are adequately effective at ranges of 200 yards out to 400 meters when supported by the bipod. At 200 yards (yards used because of the stated requirement in military characteristics) the AR-15 and M14 (USAIB) were approximately equal in the percentage of hits attained and in shot dispersion when fired from either bipod or sandbag supported prone positions. The same condition was true at 300 and 400 meters. Results indicated that automatic rifle fire can be used effectively against groups of enemy personnel at these ranges. This should not be construed to mean that the automatic rifle possesses an accurate point fire capability at these ranges. The effect achieved is really an aimed burst at a known or suspected enemy position. This fire complements the fires of machineguns and in some instances may be substituted to permit machineguns to engage longer range targets.
- b. Conclusions. The AR-15 and the M14 (USAIB) are effective automatic fire weapons at ranges out to 400 meters. At ranges beyond 400 meters test results indicate that the M14 (USAIB) is markedly superior to the AR-15 in both accuracy and lethality.

8. (U) Employment of Small Arms From Armored Personnel Carriers (APC)

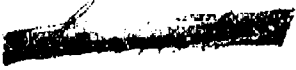
- a. Evaluation.
 - (1) All of the candidate weapons can be employed from the APC. However, the philosophy discussed in Appendix IV to Annex C on firing weapons from within the APC must be considered.
 - (2) M113 APC dimensions bearing on weapon compatibility are:
 - (a) Rear Ramp Opening - 53" wide x 49" high.
 - (b) Cargo Hatch - 30-1/2" wide x 47-1/2" long.
 - (c) Height of Troop Compartment - 49" floor to roof.

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- (3) Because of its shorter length (39 inches) and lighter weight the AR-15 is more compatible with dimensions of the APC than the M14 (modified) or M14 (USAIB). Of all candidate weapons, the AK-47 is superior from the standpoint of length. The shorter length of the AR-15 and AK-47 facilitates ease of entry and exit from the APC. Also the probability of entanglement of the weapon with protrusions inside the carrier appears to be lower than with the M14. A design concept of a folding stock M14 (USAIB) would reduce overall length to a size more compatible with the APC and equal to or superior in versatility to either the AR-15 or AK-47. This concept has been successfully demonstrated and may be the ideal weapon for use in armored and mechanized units.
 - (4) When employed in a suppressive fire role from within the APC, either the AR-15, the M14 (USAIB) or the AK-47 can be used with approximately the same degree of effectiveness. However, in a mechanized environment, the penetration power of the M14 at ranges of 400 meters and beyond against semihard targets gives this weapon a marked advantage over the other two types. Accuracy, other than when at a halt, will be affected adversely with any weapon because of carrier movement and instability of the firer and firing platform.

b. Conclusions.

- (1) The AK-47 and AR-15 are more compatible with armored personnel carrier operations than the M14 (modified) or M14 (USAIB) because of shorter length and lighter weight.
- (2) A folding stock model of the M14 (USAIB), now in design stage, may be equal or superior to the AR-15 or AK-47 for mechanized operations.
- (3) For use in a mechanized environment, the M14 (USAIB) appears to be more suitable for employment against semihard targets and at longer ranges than the AR-15 or AK-47. Significant advantages also accrue from the greater penetration capability of the weapon.

9. (U) Use of the Bayonet.


a. Evaluation. Appendix V to Annex C establishes the need for the rifle to accept a bayonet. All rifles except the AK-47 have the capability of bayonet attachment. The SPIW also has a bayonet capability.

b. Conclusions. All candidate weapons other than the SPIW are acceptable for use with the bayonet.

10. (C) Logistical Aspects.

a. Evaluation.

- (1) Desirably the rifleman should retain on his person a sufficient load of ammunition to permit participation in sustained combat for the longest period possible without resupply. Currently, because of the bulk and weight of the ammunition load, the rifleman carries that amount of ammunition required for one average day of combat. This basic load is determined based on tables developed from combat experience and amounts to 100 rounds of ammunition for each rifleman. Resupply requirements for the future can be reduced in one of two ways: developing a more accurate and lethal rifle requiring, on the average, fewer rounds of ammunition per kill; or reducing the weight of ammunition to permit the average soldier to carry a larger basic load.
- (2) Considering the ammunition for the currently available weapons, the AR-15 round is the lightest. A round of ammunition for the AR-15 weighs approximately one-half as much as that for the AK-47 and only about one-third as much as that for the M14. A 20 round loaded magazine of AR-15 ammunition weighs one-half as much as a 20 round loaded magazine for the M14. Considering only weight, the AR-15 ammunition is the most satisfactory from logistical aspects, followed by the AR-15. The M14 round is the least satisfactory.
- (3) As previously stated, weight is not the sole consideration in determining how much ammunition the soldier can carry. Bulk of the load is an important factor. The size of the load must not hamper the rifleman in the performance of his normal combat functions which will require frequent running, falling, diving and rolling into firing positions, climbing over obstacles, and similar physical functions. Considering size of the magazine only, the AR-15 20 round magazine is about

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one-third smaller than the M14 20 round magazine and therefore is the more desirable of the two. However, when carrying as much AR-15 ammunition per weight as M14 ammunition, the rifleman will be required to carry increased bulk. The AK-47 30 round magazine further compounds this problem since it is approximately twice the size of the AR-15 magazine.

- (4) Other logistical aspects to be considered include the interchangeability of ammunition between squad members. As long as personnel all carry the same type weapons, this is no problem. The rifleman who runs out of ammunition during combat can readily borrow ammunition from another rifleman who has an adequate supply (or take ammunition from a casualty). However, if a mix of weapons and caliber of ammunition is contained within the squad, resupply problems will be complicated. One advantage the M14 has in this regard is the capability of using M60 machinegun ammunition in the M14 during emergencies or when resupply is not accomplished as required.
- b. Conclusions. Of the currently developed rifles, the AR-15 ammunition is the most satisfactory from logistical aspects. An AR-15 rifleman can carry twice the number of rounds weightwise as an M14 rifleman. This load may be overly restrictive from a total bulk standpoint. The AK-47 lies between the AR-15 and M14 in this respect.

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SEMIAUTOMATIC KNOWN DISTANCE FIRING

SANDBAG FIRINGS

| Range (Meters) | Type Rifle | Average Spread (Inches) | | | Mean Radius |
|-------------------|---------------|-------------------------|-----------------------|-------------------|----------------|
| | | Maximum Vertical | Maximum Horizontal | Maximum Spread | |
| 100 | AR-15 | 5.4 | 4.2 | 6.7 | 1.9 |
| | M14 | 5.3 | 4.2 | 6.8 | 1.9 |
| 200 | AR-15 | 9.2 | 8.4 | 11.5 | 3.4 |
| | M14 | 10.6 | 8.4 | 12.7 | 3.6 |
| 300 | AR-15 | 14.5 | 14.3 | 19.4 | 5.6 |
| | M14 | 15.3 | 15.2 | 19.9 | 5.9 |
| 400 | AR-15 | 19.0 | 19.5 | 26.1 | 7.5 |
| | M14 | 20.0 | 20.1 | 28.2 | 7.5 |
| 500 | AR-15 | 24.7 | 22.7 | 30.9 | 9.0 |
| | M14 | 23.9 | 23.5 | 31.7 | 9.0 |
| 600 | AR-15 | 27.2 | 26.8 | 36.2 | 10.4 |
| | M14 | 26.0 | 26.2 | 35.9 | 10.1 |

BIPOD FIRINGS

| Range (Meters) | Type Rifle | Average Spread (Inches) | | | Mean Radius |
|-------------------|---------------|-------------------------|-----------------------|-------------------|----------------|
| | | Maximum Vertical | Maximum Horizontal | Maximum Spread | |
| 100 | AR-15 | 5.9 | 6.7 | 9.5 | 2.5 |
| | M14 | 6.1 | 5.5 | 8.6 | 2.2 |
| 200 | AR-15 | 9.8 | 12.1 | 15.8 | 4.2 |
| | M14 | 13.3 | 8.5 | 14.9 | 3.8 |
| 300 | AR-15 | 18.7 | 12.5 | 20.9 | 5.9 |
| | M14 | 19.7 | 16.2 | 25.3 | 6.7 |
| 400 | AR-15 | 24.7 | 27.6 | 35.3 | 10.3 |
| | M14 | 25.0 | 22.8 | 32.6 | 9.0 |
| 500 | AR-15 | 31.6 | 20.5 | 35.8 | 9.8 |
| | M14 | 23.4 | 24.6 | 32.8 | 9.4 |

INCLOSURE 1 to APPENDIX II to ANNEX E

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AUTOMATIC FIRE

25 Meters

| AR-15 | | | | M14(M) | | | | M14(USC TB) | | | | | |
|----------|-------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------|-------|--------|------|
| Position | Burst | AVC | | AVG | | AVG | | AVG | | | | | |
| | | 40-In Circle | 60-In Circle | 40-In Circle | 60-In Circle | 40-In Circle | 60-In Circle | 40-In Circle | 60-In Circle | | | | |
| Standing | 2-3 | 79 | 94 | 100 | 3.8' | 48 | 59 | 89 | 6.5' | 61 | 82 | 100 | 3.9' |
| | 5 | 52 | 76 | 88 | 5.2' | 31 (4) | 60(4) | 73(4) | 7.3' | 49 | 77 | 83 | 4.9' |
| Kneeling | 2-3 | 75(1) | 90(1) | 100(1) | 4.1' | - | - | - | - | 50(1) | 75(1) | 100(1) | 4.2' |
| | 5 | 38 | 95 | 100 | 3.1' | 58 | 64 | 87 | 6.3' | 78 | 97 | 100 | 3.0' |
| | 5 | 64 | 81 | 96 | 4.7' | 37(3) | 63(3) | 77(3) | 5.9' | 62 | 87 | 92 | 5.0' |
| | 10 | 58(3) | 90(3) | 96(3) | 4.9' | - | - | - | - | 57(2) | 84(2) | 91(2) | 4.4' |

50 Meters

| | | | | | | | | | | | | | |
|----------|-------|-------|-------|------|---|----|---|------|---|-------|-------|-------|------|
| Standing | | 51 | | 71 | | 87 | | 4.6' | | 47(4) | | 47(4) | |
| 5 | 65(1) | 75(1) | 95(1) | 4.2' | - | - | - | - | - | 75(1) | 90(1) | 4.1' | 4.2' |
| 10 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Kneeling | | 55 | | 68 | | 89 | | 4.4' | | 46(4) | | 49(4) | |
| 5 | 60(1) | 75(1) | 90(1) | 4.1' | - | - | - | - | - | 49 | 69 | 90 | 4.0' |
| 10 | - | - | - | - | - | - | - | - | - | 70(1) | 80(1) | 90(1) | 4.4' |

75 Meters

| | | | | | | | | | | | | | |
|----------|---|----|---|----|---|----|---|------|---|----|---|----|---|
| Standing | | 50 | | 62 | | 74 | | 5.8' | | 49 | | 51 | |
| 5 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Kneeling | | 46 | | 59 | | 77 | | 6.1' | | 46 | | 51 | |
| 5 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10 | - | - | - | - | - | - | - | - | - | - | - | - | - |

100 Meters

| AR-15 | | | | | | | | | | | | | | M14(M) | | | | M14(USAITB) | | | | | | | | | |
|----------|--|-------|--|--------|--|--------|--|--------|--|-------------|--|--------|--|--------|--|--------|--|-------------|--|--------|--|--------|--|--------|--|-------------|--|
| | | Rd in | | 40-In | | 60-In | | 6 x 6 | | Avg | | 40-In | | 60-In | | 6 x 6 | | Avg | | 40-In | | 60-In | | 6 x 6 | | Avg | |
| | | Burst | | Circle | | Circle | | Target | | Shot Spread | | Circle | | Circle | | Target | | Shot Spread | | Circle | | Circle | | Target | | Shot Spread | |
| Position | | 2-3 | | 96 | | 100 | | 100 | | 2.5' | | 61 | | 74 | | 89 | | 3.5' | | 97 | | 100 | | 100 | | 2.4' | |
| Bipod | | 5 | | 87 | | 98 | | 100 | | 3.8' | | - | | - | | - | | - | | 85 | | 96 | | 100 | | 4.0' | |
| | | 10 | | 81 | | 97 | | 99 | | 4.5' | | - | | - | | - | | - | | 79 | | 96 | | 100 | | 4.6' | |
| Sandbag | | 2-3 | | 94 | | 100 | | 100 | | 3.0' | | 54 | | 68 | | 81 | | 3.7' | | 99 | | 100 | | 100 | | 2.7' | |
| | | 5 | | 82 | | 93 | | 97 | | 4.1' | | - | | - | | - | | - | | 86 | | 97 | | 100 | | 3.7' | |
| | | 10 | | 73 | | 90 | | 95 | | 4.4' | | - | | - | | - | | - | | 81 | | 96 | | 100 | | 3.9' | |

200 Yards

| Equipment | Time | 83 | 98 | 100 | 3.1' | 52 | 54 | 61 | 5.2' | 85 | 98 | 100 | 5.0' |
|-----------|------|----|----|-----|------|----|----|----|------|----|-----|-----|------|
| Bipod | 2-3 | 83 | 98 | 100 | 3.1' | 52 | 54 | 61 | 5.2' | 85 | 98 | 100 | 5.0' |
| | 5 | 74 | 91 | 96 | 4.8' | - | - | - | - | 73 | 94 | 95 | 4.6' |
| | 10 | 69 | 88 | 94 | 5.2' | - | - | - | - | 62 | 85 | 92 | 5.4' |
| Sandbag | 2-3 | 80 | 97 | 100 | 3.8' | 52 | 53 | 53 | 5.6' | 87 | 100 | 100 | 3.1' |
| | 5 | 66 | 87 | 93 | 3.9' | - | - | - | - | 76 | 98 | 99 | 4.2' |
| | | | | | | | | | | | | | |
| | 10 | 65 | 84 | 90 | 4.1' | - | - | - | - | 71 | 84 | 93 | 4.3' |

300 Meters

| | | | | | | | | | | | | | |
|---------|-----|----|----|----|------|----|----|----|------|----|----|----|------|
| Blood | 2-3 | 71 | 93 | 98 | 4.9' | 46 | 48 | 51 | 7.2' | 74 | 9- | 98 | 4.3' |
| Sandbag | 2-3 | 63 | 81 | 90 | 5.2' | 50 | 50 | 51 | 7.1' | 76 | 96 | 99 | 4.3' |

400 Meters

| | | | | | | | | | | | | | |
|---------|-----|----|----|----|------|----|----|----|------|----|----|----|------|
| Blood | 2-3 | 54 | 73 | 84 | 5.7' | 45 | 48 | 51 | 8.5' | 63 | 81 | 91 | 5.5' |
| Sandbag | 2-3 | 51 | 69 | 79 | 5.9' | 51 | 51 | 52 | 8.7' | 68 | 83 | 92 | 5.6' |

FIELD COMBAT FIRING TEST

1. Day Defense: Five squads participated. Squad composition was six riflemen and two automatic riflemen. Target ranges were from 200 to 425/475 meters. Each squad fired 640 rounds from each rifle. Total results per squad were:

| Squad | AR-15 Rifle | | | M14 Rifle | | | M14(USAIB) Rifle | | |
|-------|-------------|-----------|-------------|------------|-----------|-------------|------------------|-----------|-------------|
| | Total Tgts | Total Hit | Total Score | Total Tgts | Total Hit | Total Score | Total Tgts | Total Hit | Total Score |
| 1 | 19 | 42 | 137 | 27 | 65 | 200 | 36 | 112 | 292 |
| 2 | 21 | 52 | 157 | 23 | 82 | 197 | 24 | 79 | 199 |
| 3 | 23 | 56 | 171 | 26 | 67 | 197 | 24 | 70 | 190 |
| 4 | 20 | 44 | 149 | 24 | 63 | 183 | 27 | 106 | 241 |
| 5 | 20 | 54 | 164 | 22 | 81 | 191 | 25 | 89 | 214 |

2. Day Offense: Squad composition was six riflemen and two automatic riflemen. The same squad participated in all firings on this course. A second run was made with the AR-15 to determine if increased weapon familiarity would increase hit capability. Total ball ammunition expended was 1600 rounds.

| Squad | AR-15 Rifle | | | M14(M) Rifle | | | M14(USAIB) Rifle | | |
|-------|-------------|-----------|-------------|--------------|-----------|-------------|------------------|-----------|-------------|
| | Total Tgts | Total Hit | Total Score | Total Tgts | Total Hit | Total Score | Total Tgts | Total Hit | Total Score |
| 1 | 4 | 13 | 33 | 5 | 26 | 51 | 6 | 17 | 47 |
| | 4 | 12 | 32 | | | | | | |

3. Night Defense Course: Squad composition was six riflemen and two automatic riflemen. Firing was from prepared foxholes. Maximum target range was 110 meters. Twenty-four targets were at ranges of 20 to 40 meters. Total number of rounds fired per squad was 400. Tracer ammunition was not available for the AR-15.

| Squad | Type Ammo | AR-15 Rifle | | | M14 Rifle | | | M14(USAIB) Rifle | | |
|-------|-----------|-------------|-----------|-------------|------------|-----------|-------------|------------------|-----------|-------------|
| | | Total Tgts | Total Hit | Total Score | Total Tgts | Total Hit | Total Score | Total Tgts | Total Hit | Total Score |
| 1 | Ball | 8 | | 38 | 7 | 22 | 57 | 9 | 34 | 79 |
| | Tracer | - | | | 11 | 52 | 107 | 10 | 54 | 104 |
| 2 | Ball | 4 | | 4 | 10 | 24 | 74 | 9 | 63 | 108 |
| | Tracer | - | | | 11 | 115 | 170 | 10 | 68 | 118 |
| 3 | Ball | 4 | | 22 | 7 | 21 | 56 | 8 | 31 | 71 |
| | Tracer | - | | | 9 | 41 | 86 | 13 | 69 | 134 |
| 4 | Ball | 6 | | 28 | 7 | 25 | 60 | 10 | 24 | 74 |
| | Tracer | - | | | 12 | 42 | 102 | 12 | 59 | 119 |

INCLOSURE 3 to APPENDIX II ANNEX E

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4. Night Offense: Five squads participated. Squad composition was six riflemen and two automatic riflemen. Target array was the same as during the day offense course. Total ammunition allotted per squad run for each rifle was 400 rounds. Tracer ammunition was not available for AR-15. Results were:

| Squad | Type Ammo | AR-15 Rifle | | | M14 Rifle | | | M14(USAIB) Rifle | | |
|-------|--------------|---------------|--------------|------------------------|---------------|--------------|------------------------|------------------|--------------|------------------------|
| | | Total Tgts | Total Hit | Total Hits Score | Total Tgts | Total Hit | Total Hits Score | Total Tgts | Total Hit | Total Hits Score |
| 1 | Ball | 2 | | 3 | 4 | 8 | 28 | 5 | 20 | 45 |
| | Tracer | - | | | 4 | 14 | 34 | 3 | 13 | 28 |
| 2 | Ball | 3 | | 5 | 4 | 13 | 33 | 5 | 16 | 41 |
| | Tracer | - | | | 4 | 12 | 32 | 5 | 14 | 39 |
| 3 | Ball | 3 | | 12 | 4 | 6 | 26 | 3 | 4 | 19 |
| | Tracer | - | | | 5 | 19 | 44 | 5 | 15 | 50 |
| 4 | Ball | 2 | | 5 | Not fired | | | 5 | 14 | 39 |
| | Tracer | - | | | | | | 7 | 24 | 69 |
| 5 | Ball | 4 | | 12 | 9 | 21 | 66 | Not fired | | |
| | Tracer | - | | | 5 | 15 | 40 | | | |

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AK-47 SEMIAUTOMATIC KNOWN DISTANCE

SANDBAG SUPPORTED

| <u>Range</u> <u>(Meters)</u> | <u>Maximum</u> <u>Vertical</u> | <u>Maximum</u> <u>Horizontal</u> | <u>Maximum</u> <u>Spread</u> | <u>Mean</u> <u>Radius</u> |
|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------|------------------------------|
| 100 | 5.2 | 6.0 | 8.1 | 2.2 |
| 200 | 11.1 | 8.2 | 13.6 | 4.2 |
| 300 | 19.2 | 16.1 | 23.0 | 6.9 |
| 400 | 29.0 | 24.8 | 32.0 | 9.7 |

Based on two 10 round shot groups.

INCLOSURE 4 to APPENDIX II to ANNEX E

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PENETRATION EFFECTS

| Material | Range (Meters) | Cartridges | | |
|---|-------------------|----------------|--------------|----------------|
| | | .223 | 7.62mm | AK-47 |
| 0.75 inch pine boards | 100 | 8 (Tumbled) | 17 (Tumbled) | 19 (No Tumble) |
| | 200 | 10 (Tumbled) | 16 (Tumbled) | 17 (No Tumble) |
| | 300 | 8 (Tumbled) | 15 (Tumbled) | 13 (No Tumble) |
| | 400 | 9 (Tumbled) | 14 (Tumbled) | 9 (No Tumble) |
| | 500 | 11 (No Tumble) | 16 (Tumbled) | |
| | 600 | 6 (No Tumble) | 9 (Tumbled) | |
| Sandbags | 100 | 4 inches* | 9.5* | 13 inches |
| | 200 | 5 inches | 11 inches | 12 inches |
| | 300 | 5 inches | 9 inches | 12 inches |
| | 400 | 4 inches | 6 inches | 6 inches |
| | 500 | 3.5 inches | 5 inches | 4 inches |
| | 600 | 2.5 inches | 5 inches | |
| Steel helmet | 100 | | | |
| | 200 | | | Both sides |
| | 300 | Both sides | | One side** |
| | 400 | One side** | | One side |
| | 500 | One side | | No |
| | 600 | No | Both sides | |
| Engine Block 2-1/2-ton truck | 100 | Yes | Yes | Yes |
| | 200 | No | Yes | Yes |
| | 300 | No | Yes | No |
| | 400 | | Yes | |
| | 500 | | Yes | |
| | 600 | | No | |
| 14 GA steel | 100 | 2 Layers | 4+ Layers | 3 Layers |
| | 200 | 2 Layers | 4+ Layers | 2 Layers |
| | 300 | 1 Layer | 4+ Layers | 2 Layers |
| | 400 | 1 Layer | 4+ Layers | 1 Layer |
| | 500 | 1 Layer | 3 Layers | Not fired |
| | 600 | Not fired | Not fired | Not fired |
| Armor vest (Titanium Plates and ballistic nylon) | 100 | | | |
| | 200 | | | |
| | 300 | Both sides | | |
| | 400 | One side | | |
| | 500 | One side | | |
| | 600 | No | Both sides | Both sides |

INCLOSURE 5 to APPENDIX II to ANNEX E

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| Material | Range (Meters) | Cartridges | | |
|---|-------------------|-------------|---------------|------------|
| | | .223 | 7.62mm | AK-47 |
| Concrete building blocks (one center rib) | 100 | One side | Both sides*** | Both sides |
| | 200 | One side | Both sides*** | Both sides |
| | 300 | | Both sides*** | One side |
| | 400 | | Both sides | One side |
| Green live oak 4-in diameter | 50 | Penetration | Penetration | |

* Complete bullet disintegration

**Damaged lines and bulged helmet on back side

***Blast effect on back side

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